AIR MONITORING EVALUATION OF SELECTED YARD WASTE MANAGEMENT FACILITIES IN SUFFOLK COUNTY

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In accordance with Suffolk County Resolutions 1129-2006 and 1472-2006, the Suffolk County Department of Health Services (SCDHS) conducted an air quality data collection program in areas near yard waste management facilities in the Yaphank, Manorville, Moriches and Bellport areas. The air monitoring in the Moriches area was no longer included in the monitoring as the compost material was removed from the site of concern before the project began. The data collection was performed by the Department of Health's Division of Environmental Quality. Regarding potential compost related human health issues, the Department of Health Services has no expertise in this area and relied on the New York State Department of Health's comments. We reviewed their comments and made minor modifications to clarify the mandate of the report and to whom it was directed.

Suffolk County Department of Health Services

ACKNOWLEDGEMENT

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ABSTRACT

At the direction of the Suffolk County Legislature, the Suffolk County Department of Health Services (SCDHS) collected air quality data near yard waste operations in five areas of central Suffolk County. Data was collected for screening purposes, knowing that it would not be sufficient to support a comprehensive health effects evaluation or an enforcement action against a particular facility. The study's primary role was to evaluate possible effects of the facilities on local air quality. Although this was a screening level effort, the resulting data set was robust enough to support several conclusions and recommendations.

Between 2007 and 2009, 55 "sniff test" events over 41 separate days were conducted at various sites among the five study areas. In addition, 44 sampling events were conducted resulting in the collection of over 700 analytical samples/results. This includes bioaerosols, respirable fine particulate matter ($PM_{2.5}$) and volatile organic compounds (VOCs).

Some level of off-site odor is expected from most yard waste management operations. During this study, odor was detected on 54% of the days "sniff tests" were performed (targeted at community exposure) and at over 90% of the analytical events (targeted at downwind conditions). This data confirms New York State Department of Environmental Conservation (NYSDEC) observations that yard waste management facilities can pose a nuisance.

There were no detections of VOCs which posed significant concerns, however data showed a potential correlation between the presence of odors and elevated levels of bioaerosol and $PM_{2.5}$ contaminants in the air samples. Thus, the "sniff test" used by NYSDEC inspectors appears to be a good indicator for contaminants of concern such as respirable fine fraction particulate matter ($PM_{2.5}$) and bioaerosols. It is noted that the NYSDEC maintains a hotline (631-444-0380) for the public to report odor complaints and investigates accordingly.

Over 50% of downwind samples exceeded background levels for bioaerosols (greater than 350 colony-forming units/m^3). At two study areas, Global Land Materials (Global) and Great Gardens, the mean downwind bioaerosol levels were higher when compared to the mean upwind levels. At Manorville Yard Waste Composting Facility (Papermill), on-site bioaerosol measurements were well below background except when the windrows were turned. All offsite levels were below background. At the Village of Bellport Composting Facility (Bellport) and Long Island Compost Company (LIE Exit 69), all bioaerosol measurements were below background levels.

At Global and Great Gardens, the mean downwind $PM_{2.5}$ level was higher when compared to mean upwind level as well as when compared to mean background measured at the Continuous Air Monitoring (CAM) trailer. At Papermill the mean onsite $PM_{2.5}$ level was about the same as the mean background level measured at the CAM trailer. All downwind offsite levels around Papermill were below the mean background level. At Bellport all $PM_{2.5}$ measurements were below the mean background level. At the LIE Exit 69 study area the mean downwind $PM_{2.5}$ level was higher than background level, however, the mean of sites perpendicular to the wind direction (neither upwind nor downwind; lateral to the direction of the wind) were also higher.

Overview of Results for Study Areas				
Study Area	**Elevated Downwind $PM_{2.5}$**	**Elevated Downwind Bioaerosol**	**Odor Frequency**	**Comment**
Global	**Yes**	**Yes**	**Frequent**	Highest fungal count measured. Grinding operation.
Great Gardens	**Yes**	**Yes**	**Very Frequent**	Very significant odors (may be associated with grinding).
Papermill	No	No	**Infrequent**	Municipal compost facility.
Bellport	No	No	**Infrequent**	Small facility, leaves only. No significant odor.
LIE Exit 69	No	No	**Frequent**	Multiple farm fields with compost windrows.

There is relatively limited data due to the number of sites investigated, availability of sampling personnel and equipment. Odor events can be of short duration, infrequent and episodic and may not have been captured during this study. It is important to emphasize that the monitoring program was limited and dealt with an exceptionally complex set of environmental variables. As such, it was never expected to produce comprehensive results or definitive conclusions.

This data collection effort recommends that olfactory ("sniff") tests should continue to be used by NYSDEC as a primary mechanism for determining potential nuisance associated with yard waste management facilities. NYSDEC should also continue its program of enhancing oversight at these facilities. While composting and yard waste recycling is environmentally beneficial, it has posed management challenges and has resulted in odor complaints for decades. Improvements in technology and management should continue to be aggressively pursued to minimize potential impacts.

Due the complexity and high costs associated with health effect studies, if the Suffolk County Legislature chooses to pursue additional studies, they should only be undertaken in the context of national assessments in order to have scientific validity.

SUMMARY

Study Areas

In accordance with Suffolk County Resolutions 1129-2006 and 1472-2006 (see Appendix 9-10), the Suffolk County Department of Health Services (SCDHS) conducted an air quality data collection program in areas near yard waste management facilities in the Yaphank, Manorville, Moriches and Village of Bellport areas. In addition, the Department was asked to evaluate the air quality in and around the Papermill Road Composting Facility in Manorville. The air monitoring in the Moriches area was no longer included in the monitoring as the compost material was removed from the site of concern before the project began. All study areas are shown in Figure 1.

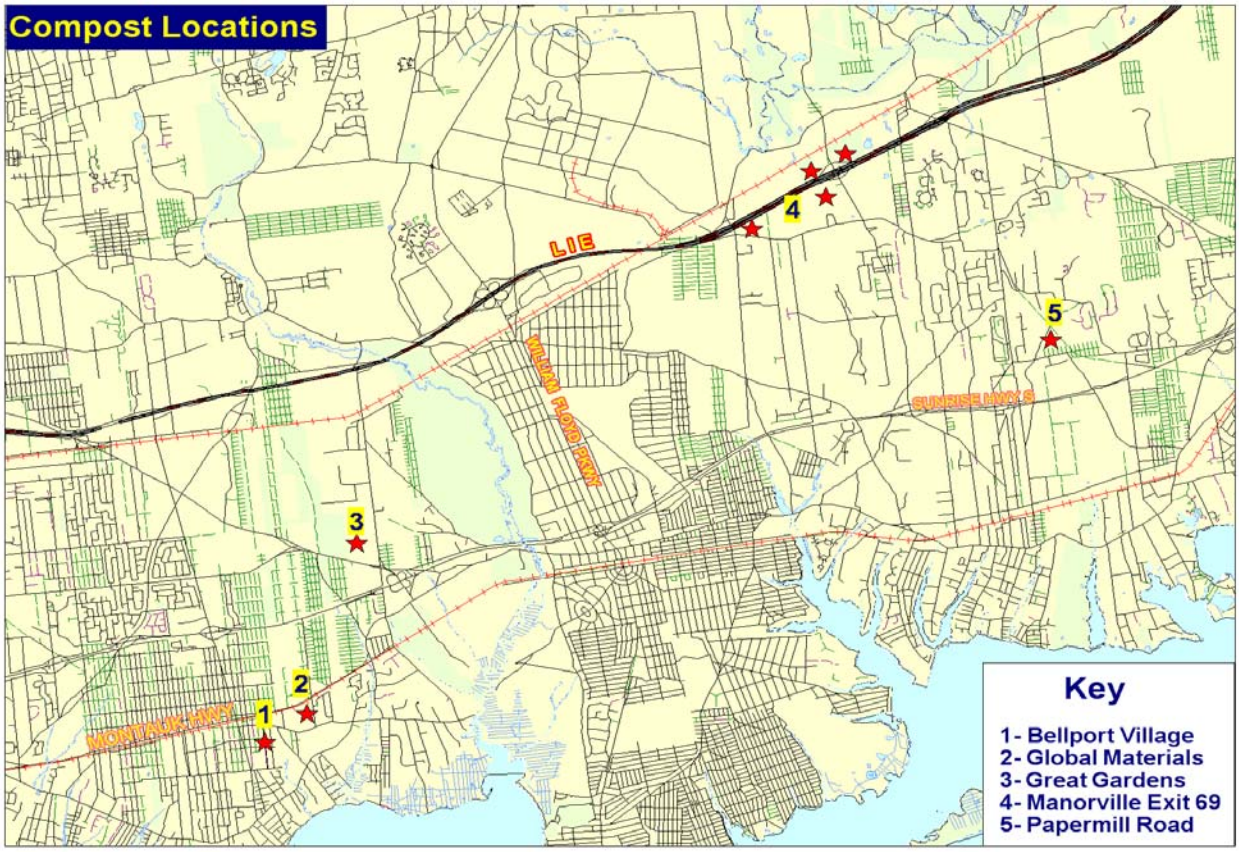

Figure 1. Compost Study Areas

Applicable Regulations

Yard waste management facilities are solid waste facilities and certain activities, but not all, fall under the jurisdiction of the New York State Department of Environmental Conservation (NYSDEC) pursuant to 6 NYCRR Part 360. These facilities are also subject to regulation by NYSDEC under 6 NYCRR Parts 211 and 257 (air pollution).

Several sections of the Air Regulations, specifically § 211.2 and § 257-1.4, prohibit the emission of odorous, toxic, or deleterious substances that unreasonably interfere with the enjoyment of property. These sections are used by NYSDEC to address odors coming from many facilities, including yard waste management operations.

The Suffolk County Sanitary Code (SCSC) does not regulate air quality or yard waste processing. Also, the SCDHS does not have a formal air program, but has limited capabilities to collect and analyze air samples.

Nature of Air Monitoring Workplan

An "Air Quality Monitoring Workplan for Yaphank, Manorville, Moriches and Bellport Areas" (see Appendix 8) was drafted and submitted to the New York State Department of Health (NYSDOH) and the NYSDEC for technical review and comments. Both agencies stated that the proposed "Workplan" will not be sufficient to provide a comprehensive study that could be used for regulatory enforcement.[1] Nevertheless, both NYSDOH and NYSDEC understood that this data collection effort was legislatively mandated, and they agreed to offer assistance by reviewing data. After discussions with County Legislature representatives and some concerned residents, it was agreed that the air monitoring would be a first step for data gathering and screening purposes only, and that results would be sent to the NYSDOH and NYSDEC for further evaluation.

Peer Review Process

External peer review of a draft report by experts at the NYSDEC and NYSDOH was requested by SCDHS as part of the "Air Quality Monitoring Workplan for Yaphank, Manorville, Moriches and Bellport Areas" (see Appendix 8). The purpose of the peer review was to provide technical comments from experts in the field of air quality assessment and management, to help assure its scientific rigor and applicability and interpretation of regulatory standards and guidelines.

External peer review of draft technical documents is a well-established method to help assure that the interpretation of study results and conclusions drawn are supported by the study data. The NYSDEC and NYSDOH comments were offered as suggestions for SCDHS to consider. SCDHS staff carefully considered all the comments received from NYSDEC and NYSDOH. In cases where there was agreement with the comments, the draft report was revised accordingly.

Sampling Protocol

Sampling was conducted in accordance with strict laboratory methodologies, as rigorously as possible, given limited resources. The SCDHS Public and Environmental Health Laboratory (PEHL) is already substantially fully dedicated to a comprehensive program of physical, bacteriological and chemical sampling of water, wastewater and sludge (over 50,000 samples analyzed annually for over 300 parameters). In this context, the air quality data collection effort was a noteworthy accomplishment.

Between 2007 and 2009, more than 700 analytical air samples were taken for 44 sampling events (on 27 separate days) at the five study areas. At each sampling event, air sampling was performed sequentially, not

[1] A more comprehensive environmental monitoring and health effects study performed by the NYSDOH (1994) at the Islip composting facility found that, while mold-spore levels were elevated downwind of the facility, respiratory symptoms in downwind neighborhood residents were not associated with those increased levels. That study involved a much larger population and a more significant composting facility.

simultaneously, upwind and downwind of the compost/mulch material related sites. Air samples were collected and analyzed for bioaerosols including *Aspergillus fumigatus* (fungi) and thermophilic actinomycetes (bacteria), fine fraction particulate matter ($PM_{2.5}$), inhalable coarse particulate matter (PM_{10}), volatile organic compounds (VOCs), hydrogen sulfide (H_2S), carbon monoxide (CO), carbon dioxide (CO_2), wind speed, wind direction, temperature and humidity. For screening purposes, air samples were typically collected over a 15 to 30 minute period (this sampling interval does not conform to the requirements of $PM_{2.5}$ ambient air monitoring). Staff collecting samples documented detectable odors, wind direction and speed.

Sampling was conducted on residential properties or other properties that were adjacent to the various study facilities. In addition, for worse case scenario considerations, sampling was conducted onsite at the Papermill facility. The sampling site selections were based upon the prevailing wind direction and presence of odors. Background ambient measurements were taken at the continuous air monitoring (CAM) trailer located in Holtsville, NY. This location is in a residential community.

It is important to emphasize that this monitoring program is limited and deals with an exceptionally complex set of environmental variables. Therefore, no scientific conclusions regarding community health risk or health impacts can be drawn from this screening-level data collection.

Odor inspections were performed at the five study areas by staff from the PEHL and Office of Pollution Control to detect the presence of compost like odors using olfactory ("sniff test") senses and to estimate wind speed and direction. However, the methods used by the different samplers to record their observations was not standardized.

Program Goals

Although this was a preliminary screening and data collection program, the data set collected was robust enough to address the following basic questions:

1. What is the frequency and intensity of downwind odors?
   - Note that this supplements olfactory inspection tests from NYSDEC.
2. Does the occurrence of odor correlate with higher contaminant levels?
3. Are local air quality impacts discernable in the vicinity of any of the facilities?

Overview of Results

1) Odors

Overall, odors were detected at 54% of the events. Odors were detected during a majority of days near Great Gardens and almost half of the days near Exit 69 LIE. Odors were infrequent or there were relatively few "sniff tests" conducted at the other sites. Based on the above data, it appears that some of the operations studied have the potential for nuisance (unreasonable interference with use or enjoyment of property). A legal determination of nuisance requires exhaustive, comprehensive data which are beyond the scope of this study. The Bellport leaf composting facility did not appear to be a significant odor source.

Summary of Odor Detections

Site	# of days study area evaluated	# of days odors detected
Bellport	7	1
Global	3	1
Great Gardens	27	21
LIE Exit 69	14	6
Papermill	4	1

2) $PM_{2.5}$

At Global and Great Gardens, the mean downwind $PM_{2.5}$ level was higher when compared to mean upwind level as well as when compared to mean background measured at the CAM trailer. At Papermill, the mean onsite $PM_{2.5}$ level was about the same as the mean background level measured at the CAM trailer. All downwind offsite levels around Papermill were below the mean background level. At Bellport all $PM_{2.5}$ measurements were below the mean background level. At the LIE Exit 69 sites, the mean downwind $PM_{2.5}$ level was higher than background level, however, the mean perpendicular to the wind direction (neither upwind nor downwind) was also higher. Mean $PM_{2.5}$ background level was determined by averaging the CAM trailer hourly average $PM_{2.5}$ measurements collected on the same day and at approximately the same time as site samples.

Summary of PM2.5 Results
(air concentrations in micrograms/cubic meter)

Site	Mean $PM_{2.5}$ Downwind sites	Mean $PM_{2.5}$ All other sites (includes upwind and neither)	Number of downwind sampling sites above daily CAM background	Number of all other sampling sites above daily CAM background
Global	24 (n=13)	21 (n=11)	10 out of 13	8 out of 11
Great Gardens	21 (n=14)	17 (n=22)	12 out of 14	12 out of 22
Papermill; Onsite Offsite	10 (n=9) includes onsite 12 (n=7) 6 (n=2)	13 (n=6)	3 out of 9 3 out of 7 0 out of 2	4 out of 6
Bellport	7 (n=1)	4 (n=2)	0 out of 1	0 out of 2
LIE Exit 69	18 (n=4)	21 (n=3)	3 out of 4	3 out of 3
CAM for all dates samples collected: Mean 11.8 micrograms/cubic meter with a standard deviation of 8.8				

3) Bioaerosols

Elevated counts of viable bioaerosols, (*Aspergillus fumigatus, AF* and thermophilic actinomycetes, TA), were recorded for samples collected downwind of study areas and compared to upwind or background values. Over 50% of downwind samples exceeded background levels for bioaerosols (greater than 350 colony-forming units/m^3). At two sites, Global Land Materials and Great Gardens, the mean downwind bioaerosol levels were higher when compared to the mean upwind levels. At Papermill, on-site bioaerosol measurements were well below background except when the windrows were turned. All offsite levels were below background. At Bellport and LIE Exit 69, all bioaerosol measurements were below background levels.

Summary of Bioaerosol Results
(air concentrations in colony-forming units/cubic meter)

Site	Mean AF downwind sites	Mean AF all other sites (includes upwind and neither)	Mean TA downwind sites	Mean TA all other sites (includes upwind and neither)
Global	1469 (n=13)	77 (n=12)	862 (n=13)	218 (n=12)
Great Gardens	1482 (n=14)	138 (n=22)	1159 (n=14)	334 (n=21)
Papermill; Onsite Offsite	 404 (n=7) 20 (n=2)	 21 (n=6)	 318 (n=7) 55 (n=2)	 139 (n=6)
Bellport	<10 (n=1)	38 (n=2)	25 (n=1)	116 (n=2)
LIE Exit 69	40 (n=4)	<10 (n=3)	115 (n=4)	58 (n=3)
CAM for all dates samples collected:	Mean 31 CFU/m^3 with a standard deviation of 48		Mean 108 CFU/m^3 with a standard deviation of 97	

4) VOCs

There were no detections of VOCs which pose a significant concern. Of the VOCs measured, the majority were less than the limit of quantitation. Some of the VOCs detected were also detected at the background CAM site, as well as at upwind sites. Results from this study indicate that the source of detected VOCs may not be associated with facility operations

5) Odor and Contaminant Level Correlation

Based on 44 sampling events, this data collection effort found that contaminants of concern included bioaerosols and $PM_{2.5}$. Paired downwind odor and analytical data showed a potential correlation between the presence of odors and elevated levels of bioaerosol and $PM_{2.5}$. Data is summarized as follows.

Summary of Downwind Odor for all Sites
with Corresponding AF counts and average $PM_{2.5}$

Odor Description*	# of Occurrences (%)	AF (mean CFU/m^3)	Avg. $PM_{2.5}$ (mean ug/m^3)
No odor	3 (7.3)	15	7
Weak	10 (24.4)	310	16
Medium	20 (48.8)	1144	20
Strong	8 (19.5)	2123	25

* If odor was described as present, it was classified as medium
If odor was described as intermittent with wording such as medium, it was classified as medium.
If odor was described as intermittent w/o any other wording, it was classified as weak.

The data suggests that the olfactory test for nuisance odors (downwind of a facility) appears to be a good indicator for contaminants of concern such as $PM_{2.5}$ and bioaerosols. There were no detections of VOCs which posed significant concerns so no correlation was made between odors and VOC's.

Note that the odor detection rate of over 90% for downwind sampling locations was higher than the level that was observed for the "community sniff tests" (54%). This is because, during downwind sampling events, considerable efforts were made to detect downwind odor and establish appropriate sampling locations, even when community exposure was not evident and odors would not have detected during a community "sniff test".

Summary by Study Area

Overall, the Bellport facility did not appear to result in odors or significant levels of air contaminants. Analytical data was limited for this site, but, based on the limited size and nature of the operation (leaves left intact to compost), the site does not appear to pose concerns.

Based on limited data and site visits, the Papermill facility appeared to be generally well managed. The single sampling event with an elevated Aspergillus count was collected onsite and occurred when windrows were being turned. The Papermill facility was the only facility where several of the measurements were made on-site, due to access, as well as the ability to capture potential worst-case conditions.

Global and Great Gardens had the highest $PM_{2.5}$ and bioaerosol levels. These issues appear to be associated with grinding operations at the facilities.

There is a limited amount of analytical data available for LIE Exit 69 study area. However, "sniff tests' revealed that compost like odors were detected on 6 of the 14 days that the study area was evaluated.

Summary of Downwind Results

Site	% Bioaerosol > 350 CFU/ m^3	% $PM_{2.5} \geq 38$ ug/m^3 *	Comments
Bellport	0 % AF (n=1) 0% TA (n =1)	0 % average (n=1)	Small, leaf only facility, no significant odor
Global	62% AF (n=13) 62% TA (n=13)	15 % average (n=13)	Highest fungal counts, grinding operation
Great Gardens	86% AF (n=14) 71% TA (n=14)	14 % average (n=14)	Very significant odors, odors correlated with grinding operation, transfer station (DEC)
LIE Exit 69	0 % AF (n=4) 0 % TA (n=4)	25 % average (n=4)	Multiple farm field with compost windrows
Papermill	11% AF (n=9) 22% TA (n=9)	0 % average (n=9)	Municipal compost facility

* = based on background one hour mean at CAM site collected on days of sample collection (mean+3 std. dev.). Samples collected over a 15 – 30 minute period

Data Limitations

This data gathering study has several limitations. Although the overall data set as a whole is robust, there is limited data for each site due to the number of sites being investigated, availability of sampling personnel, and equipment. Odor events can be of short duration, infrequent and episodic and may have been underestimated or overestimated during this study. In addition, there are no standards or guidelines for many parameters, such as bioaerosols or certain VOCs. Also, certain ambient air standards require more comprehensive sampling which was not possible during this study.

Health Effects

The contaminants measured in this screening study are ones thought to be common to yard waste management facilities handling organic materials such as yard waste and land-clearing debris and also can be associated with acute health effects. Individuals exposed to elevated levels of airborne $PM_{2.5}$ and bioaerosols, as well as waste-processing odors could experience increased health symptoms depending on the frequency and degree of

exposure and the individual sensitivities or health status of the person exposed. For example, people with allergies to Aspergillus or actinomycetes could experience increased hay fever or asthma symptoms if their frequency or level of exposure was increased substantially. Similarly, increased exposure to $PM_{2.5}$ could exacerbate respiratory or chest symptoms in people with pre-existing asthma or heart disease. Although part of this study was intended to explore whether facility emissions and their effects on local air quality might be associated with increased risk of any health symptoms in the local population, the limitations of the study did not permit scientifically valid conclusions to be made regarding this specific association.

Recommendations

1) Olfactory ("sniff") tests should continue to be used by NYSDEC as a primary mechanism for determining potential nuisance associated with composting facilities. The odor indicator may sometimes be closely associated with elevated contaminants of concern (bioaerosols and $PM_{2.5}$).

2) In communities where odors occur, residents should continue to contact the NYSDEC hotline so that incidents can be properly investigated and documented. The NYSDEC has primary regulatory authority over these types of facilities and will respond as appropriate.

3) NYSDEC should continue its program of enhancing oversight at yard waste management facilities. (see, e.g., Appendix 11, Great Gardens consent agreement). While yard waste recycling is environmentally beneficial, it has posed management challenges and has resulted in odor complaints for decades. Improvements in technology and management should continue to be aggressively pursued to minimize potential impacts.

1) Introduction

In response to Suffolk County Resolutions 1129-2006 and 1472-2006 (see Appendices 9-10), the Department of Health Services (SCDHS) conducted an air quality data collection program in areas near yard waste management facilities in the Yaphank, Manorville, Moriches and Bellport Village areas. In addition, the Department was requested to evaluate the air quality in and around the Papermill Road Composting Facility in Manorville. The air monitoring in the Moriches area was no longer included in the monitoring as the compost material was removed from the site of concern before the project began. All study areas are shown in Figures 2 – 6.

Compost/Mulch/Transfer Station sites evaluated:

1. Leaf Compost Facility - Village of Bellport,
   Wards Lane, Bellport

2. Global Land Material, Inc.
   20 Arthur Avenue, Brookhaven, NY

3. Great Gardens/Long Island Compost Corporation
   445 Horseblock Rd., Yaphank, NY

4. Other Composting Sites near Exit 69 of the Long Island Expressway

5. Manorville Compost Facility - Town of Brookhaven
   Papermill Rd., Manorville, NY

Figure 2. Manorville Compost Facility, Papermill Road, Manorville

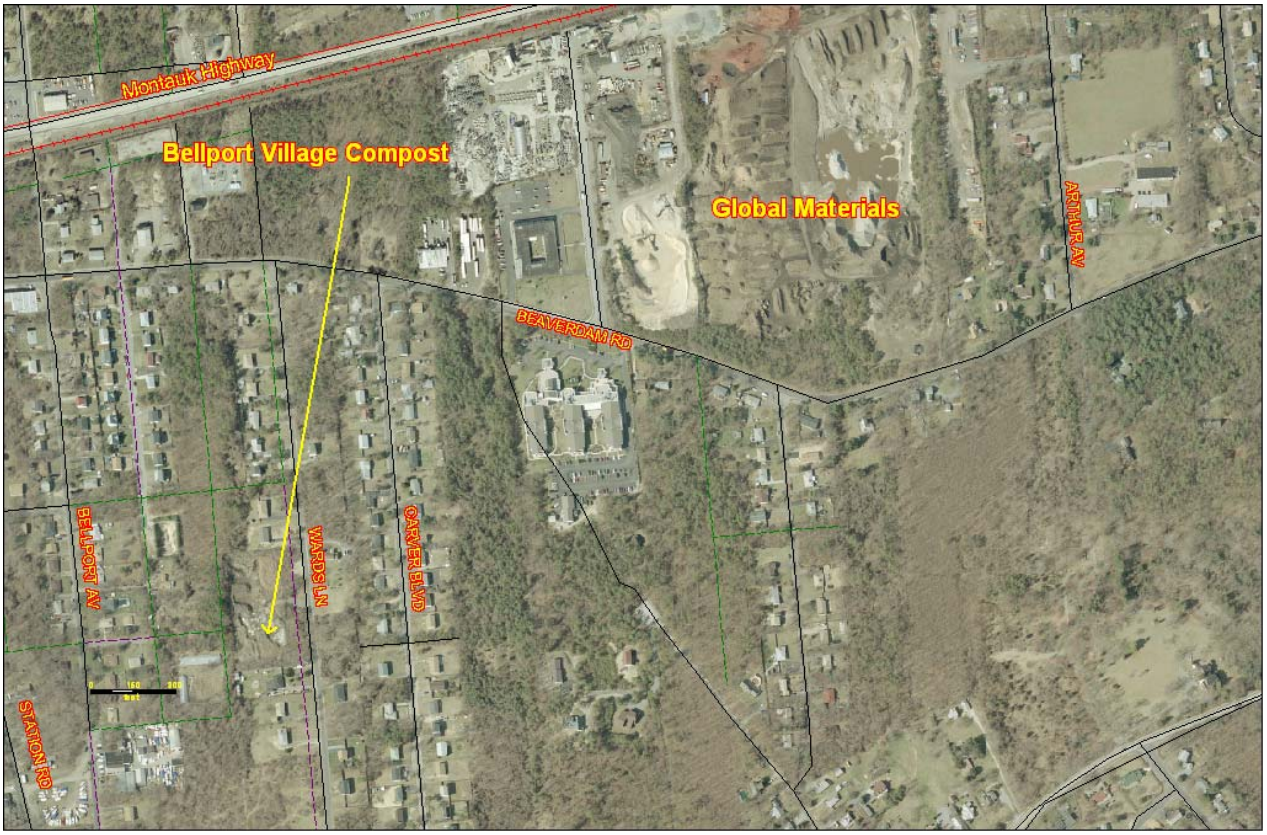

Figure 3. Bellport Study Area

NYSDEC Facility Information:

Global Land Materials
Arthur Avenue, Bellport
DEC Registration No. 52-W-69R
Regulated under 6NYCRR Part 360-1 and 360-16
Authorized to accept recognizable uncontaminated concrete, asphalt pavement, brick, soil and unadulterated wood. On-site storage is limited to 40,000 cubic yards (CY).

Village of Bellport Composting Facility
Less than 3,000 CY yard waste is exempt from Part 360 Regulation

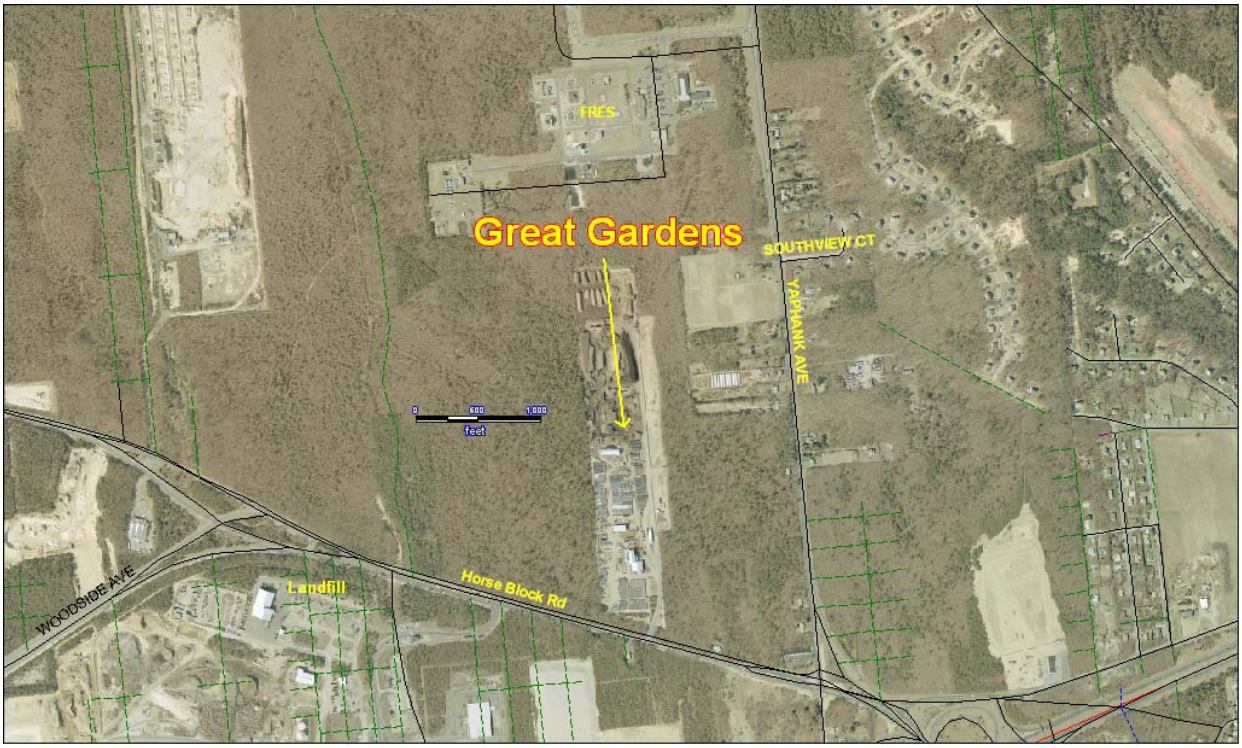

Figure 4. Yaphank Study Area

NYSDEC Facility Information:

Great Gardens LLC
Horseblock Road, Yaphank
DEC Permit No. 1-4722-03647/00001 Facility ID No. 52-T-114
Regulated under 6NYCRR 360-1 and 360-11
Authorized to operate a transfer station for yard waste and source separated organic waste. Throughput limit is 85,500 tons annually.

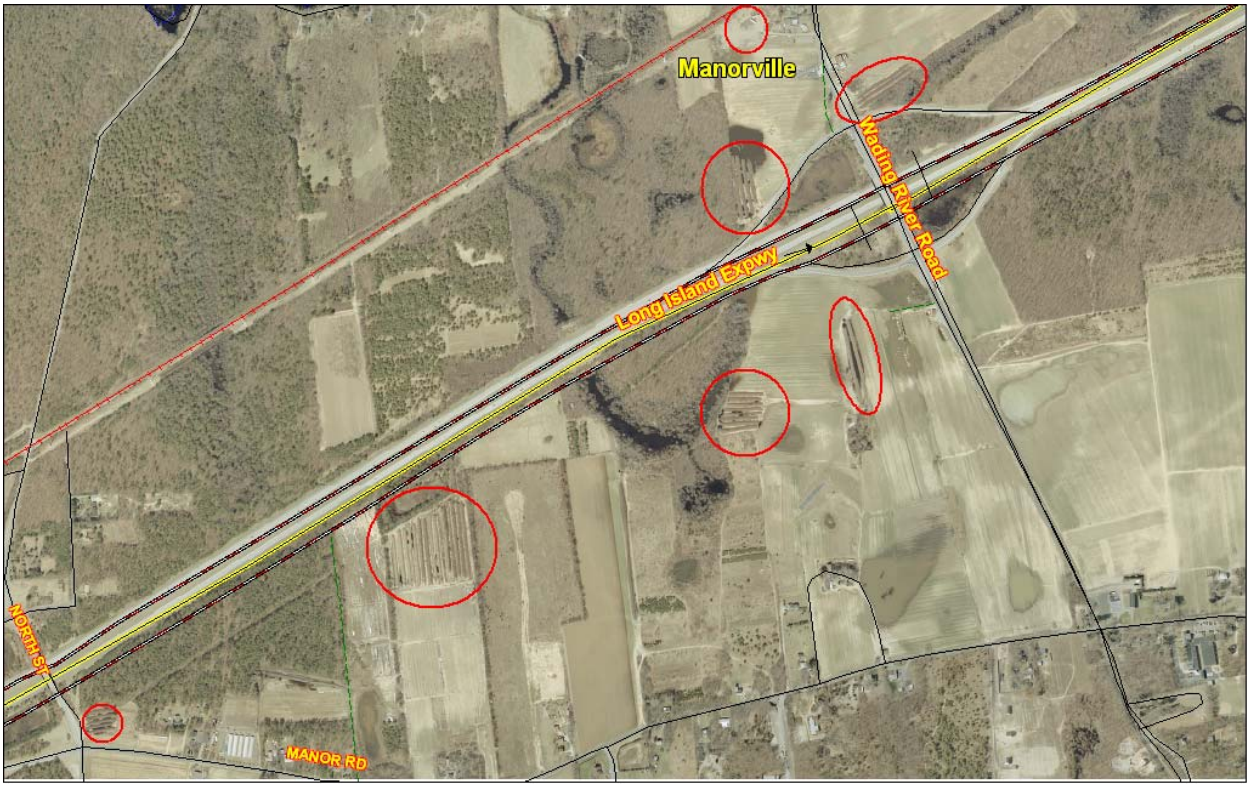

Figure 5. Exit 69 Long Island Expressway Compost Study Area

NYSDEC Facility Information:

Long Island Compost Company - Farm #02
Wading River Road (South of LIE, North of South St.), Manorville
DEC Registration No. 52-Y-31R
Regulated under 6NYCRR Part 360-1 360-5
Authorized to accept less than 10,000 CY of yard waste.

Long Island Compost Company - Farm #06
Wading River Road (west side of road at LIE North Service Rd)
DEC Registration No. 52-Y-33R
Regulated under 6NYCRR Part 360-1 360-5

Long Island Compost Company - Farm #07
Wading River Road (East side at LIE North Service Rd)
DEC Registration No. 52-Y-34R
Regulated under 6NYCRR Part 360-1 360-5
Authorized to accept less than 10,000 CY of yard waste.

Figure 6. Papermill Road Compost Facility

NYSDEC Facility Information:

Town of Brookhaven - Department of Waste Management
Manorville Yard Waste Composting Facility
Paper Mill Road, Manorville
DEC Permit No. 1-4722-00912/00002 Facility ID No. 52-C-21
Regulated under 6NYCRR 360-1 and 360-5
Authorized to accept up to 120,000 CY of yard waste and horse manure (less than 2,000 CY) annually.

Recycling of yard waste is an important component of solid waste management. It provides resource conservation through source reduction, recycling, and reuse. However, yard waste processing produces air emissions that may impact local receptors. The exothermic process involved in composting produces atmospheric releases of CO_2, water vapor, and other organic and inorganic gases such as ammonia (NH_3), methane (CH_4), VOCs, amines and sulfides. Yard waste processing is also a source of particulate matter and bioaerosol emissions.

Sources of fugitive dust emissions from such operations include chipping and grinding operations, compost/windrow turning, curing, screening, storage and loading. Impact of particulate matter emissions on surrounding areas depends on wind speed and direction. Uncontrolled emissions, odors and dust generated by these operations can be a source of public complaints. Emissions and odors can dramatically increase if windrows are not properly maintained and/or if chipped and ground material is allowed to decompose anaerobically.

Composting conditions encourage the growth of bacteria, such as thermophilic actinomycetes (TA). High temperature and humidity conditions inside compost piles also favor the growth of *Aspergillus fumigatus* (AF) and certain other fungi.

AF and TA are common and ubiquitous and people are regularly exposed to them in the air without harm. However, in sensitive individuals, particularly people with other pre-existing conditions such as asthma, chronic sinusitis or lung disease or in patients that are immune compromised responses range from allergic reactions, to allergic bronchopulmony aspergillosis (ABPA), aspergilloma, and invasive infections.

Figure 7. Microscopic view of *Aspergillus fumigatus*.

In 1992, an intensive monitoring program was undertaken at the Islip Composting Facility with analysis of potential health impacts in a nearby residential community. This study showed higher mold spore levels downwind of the compost facility, but did not find that respiratory symptoms as recorded by nearby residents in symptom diaries were associated with those spore levels. The Islip effort suggested that increased compost-related spore levels were not contributing to significant increases in respiratory symptoms, but could not exclude the possibility that there was a weak association that could not be detected statistically.

Particle pollution, especially fine particles ($PM_{2.5}$), contains microscopic solids or liquid droplets, including bioaerosols. Frequent and prolonged exposure to high levels of $PM_{2.5}$ can cause a variety of serious health problems, including:

- Increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing, for example;
- Decreased lung function;
- Aggravated asthma;
- Development of chronic bronchitis;
- Irregular heartbeat;
- Nonfatal heart attacks; and
- Premature death in people with heart or lung disease

Volatile organic compounds, including alcohols, esters, hydrocarbons, ketones and sulfur and nitrogen containing compounds can be emitted by microorganisms. Some of these VOCs have been identified or implicated in odors from yard waste processing operations.

Hydrogen sulfide (H_2S) is one of the common sulfur compounds contributing to odors at composting facilities. H_2S is a colorless gas, with a disagreeable odor, often described as that of rotten eggs. Some people can smell H_2S at very low levels, as low as 0.0005 ppm. Short-term exposure to moderate amounts of H_2S in the workplace produces eye, nose and throat irritation, nausea, breathing difficulties, headaches and lost of appetite and sleep. Limited information is available about exposure levels in studies of people working in or living near industries emitting H_2S.

Odors from composting/mulching operations are affected by a number of factors. Under some circumstances, the process produces relatively little odor and the odors are not ones that most persons find objectionable. If the composting process becomes anaerobic, however, it can produce odors that commonly regarded as objectionable. Anaerobic decomposition produces intermediate products such as amines, fatty acids, organic sulfur compounds, terpenes, and other intermediates, some of which have odors that are commonly regarded as offensive. The mixture of these intermediate products that would actually be produced from a given batch of compost depends on the starting materials and the conditions under which they are composted.

The shape and size of composting piles and methods used to expose the waste to air, also effect their production of odors. The piles need to be large enough to heat up but not so large that air cannot get in to them. The excessive size of compost piles can cause an odor problem. The length of time between when the composting material is placed at a facility and when the composting material is moved affects how far the decomposition process has progressed and, in turn, affects the odor released when the material is moved. Excessive moisture in the composting material can lead to anaerobic conditions and odors. The movement of odor offsite would be affected by the weather, including wind and air inversions, and by the topography of the area around the composting site.

The contaminants measured in this screening study are ones thought to be common to yard waste management processing facilities handling organic materials such as yard waste and land-clearing debris and also can be associated with acute health effects. Individuals exposed to elevated levels of airborne $PM_{2.5}$ and bioaerosols, as well as waste-processing odors could experience increased health symptoms depending the frequency and degree of exposure and the individual sensitivities or health status of the person exposed. For example, people with allergies to Aspergillus or actinomycetes could experience increased hay fever or asthma symptoms if their frequency or level of exposure was increased substantially. Similarly, increased exposure to $PM_{2.5}$ could exacerbate respiratory or chest symptoms in people with pre-existing asthma or heart disease. However, this study was not designed to assess whether facility emissions and their effects on local air quality are actually associated with increased risk of any health symptoms in the local population.

2) Methods and Sampling Protocol

Staff from the Division of Environmental Quality, Public & Environmental Health Laboratory (PEHL) performed fence-line air quality tests at study areas. At the Papermill site, in addition to fence line air quality tests, onsite testing was also performed to assess a worse case scenario. The onsite data is also included in the data summary tables. Air quality testing was conducted during the period from 7/13/07 to 3/20/09. Analytical air samples were taken at the five study areas. Sampling sites were chosen based on wind direction and odor intensity. At each sampling event, air sampling was performed sequentially, not simultaneously, downwind, upwind and/or perpendicular to wind direction of the compost/mulch material related sites. Sampling was

performed as close as possible to the fence-line of the site. At one site, onsite testing was performed to assess a worse case scenario.

Air samples were collected and analyzed for bioaerosols including *Aspergillus fumigatus* (fungi) and thermophilic actinomycetes (bacteria), fine fraction particulate matter ($PM_{2.5}$), inhalable coarse particulate matter (PM_{10}), volatile organic compounds (VOCs), hydrogen sulfide (H_2S), carbon monoxide (CO), carbon dioxide (CO_2), wind speed, wind direction, temperature and humidity. For screening purposes, air samples were typically collected over a 15 to 30 minute. Using olfactory senses, the presence/absence of odors was documented at each sampling site.

In addition, odor inspections were performed at the five study areas by staff from the PEHL and Office of Pollution Control to detect the presence of facility-related odors using olfactory ("sniff test") senses and to estimate wind speed and direction. Fifty-five inspection events were performed at the five study areas (195 "sniff tests" performed over 41 days) from August 27, 2007 to January, 2009, for olfactory odor inspection only (no analytical data collected during these events)**.** These visits were mostly random, but, on two occasions, were based upon complaints. These inspections were based on potential exposure to the community at accessible locations, and did not bound all "worst-case odor" conditions (e.g., when the downwind location was in the woods). If available, locations were documented using GPS. The individual would then drive to an upwind position, if possible, to document the presence or absence of odors. Some individuals attempted to describe the intensity of the odor, however, the variation in sensitivity to odor between individuals can be substantial.

Outdoor microbiological air samples were collected to monitor fugitive emissions from the study areas. Prior to sampling, specific data quality objectives were chosen, namely, to collect representative air samples for specific types of fungi (AF) and bacteria (TA). Bioaerosol sample collection equipment, media selection and incubation temperatures were chosen to provide optimum capture efficiency, organism selectivity, and high temperature growth conditions (to best emulate conditions in a compost windrow). See Appendix 6 entitled "Outdoor Biological Air Monitoring at Suffolk County, N.Y. Yard Waste Management Facilities" for a complete description of sampling and analysis procedures.

The agar media choice for the collection of fungal spores was Rose Bengal. All colonies seen growing under these conditions on the Rose Bengal agar strips were identified as AF. The agar media of choice for the targeted bacteria, TA, was trypticase soy agar. No attempt was made to identify isolates as to species. Therefore, these counts are simply reported as TA.

In order to access the impact of particulate matter from the various study areas, readings of fine particulate matter ($PM_{2.5}$), with a diameter of less than or equal to 2.5 micrometer, were taken for a minimum of 15 minutes using a portable battery operated instrument (Thermo Electron Corporation model pDR-1200) fitted with a size selective inlet to monitor particles from 0.1 micrometers (μm) to 2.5 μm. In addition, inhalable coarse particulate matter (PM_{10}), particles with a diameter of $\leq$ 10 μm, were also assessed for approximately a 5-minute period.

Air samples for VOCs were collected at off site locations near Global, Great Gardens and the LIE Exit 69 study areas for the determination of 94 - 98 VOCs. Samples were collected on sorbent tubes for $\leq$ 30 minutes and were analyzed via USEPA Method TO-17 using a Perkin Elmer model TD-650 thermal desorber autosampler and a Varian model 2000 GC/MS.

Air samples were collected in Tedlar bags for the determination of hydrogen sulfide. Sample collection required less than 10 minutes. The collected air samples were then analyzed at the CAM in Holtsville via a Model 1100 Ecotech H_2S analyzer.

Real time measurements for carbon monoxide, carbon dioxide, temperature and humidity were made using a Gray Wolf DirectSense 100 IAQ monitor. Data points for all four parameters were acquired every minute for a minimum 15 minutes at each sampling site.

Wind speed and direction readings were recorded at each sampling event utilizing a Climatronics (Bohemia N.Y.), model 102254-A4C1EXXM self-orienting portable sensor. In addition, meteorological on site readings were compared to readings from certified instrumentation at the CAM trailer located in Holtsville, N.Y. (USEPA AIRS code 36-103-0009).

Background ambient air measurements were taken at the CAM trailer located at the Sagamore Middle School, 57 Division Street, Holtsville, NY. This location is in a residential community and does not have the potential to be influenced by emissions from any yard waste management facility. In addition, at each study site upwind locations were also used to obtain background measurements.

3) Results

Bioaerosols

A background benchmark for bacteria (TA) of 350 CFU/m^3, based on the maximum bacteria measurement at the CAM site of 325 CFU/m^3(the background mean at the CAM site collected on days of sample collection is 108 CFU/m^3 with a standard deviation of 96.8 CFU/m^3), was selected. The mean is calculated using one half the limit of quantitation (LOQ) when the results are less than the LOQ. A background benchmark for fungus (AF) of 350 CFU/m^3 is based on the maximum upwind measurement of all sites of 323 CFU/m^3. The use of upwind site data is a better indicator of regional differences in background levels (e.g. near a wooded area vs. a residential area). However, due to one site being in close proximity to a sewage treatment plant, upwind TA data were not used.

Bioaerosol measurements show high variability for most of the sites evaluated. At Global, the mean downwind bioaerosol levels are higher than mean upwind levels. The mean downwind AF is 1470 CFU/m^3 compared to an upwind mean of 50 CFU/m^3. The mean downwind TA is 860 CFU/m^3 compared to an upwind mean of 210 CFU/m^3. The mean downwind levels for AF and TA are above background benchmarks.

At Great Gardens, the mean downwind bioaerosol levels are higher than mean upwind levels. The mean downwind AF is 1480 CFU/m^3 compared to an upwind mean of 63 CFU/m^3. The mean downwind TA is 1160 CFU/m^3 compared to an upwind mean of 160 CFU/m^3. The mean downwind levels for AF and TA are above background benchmarks.

At Papermill, onsite AF measurements are well below background benchmarks except when the windrows were turned. The mean AF is 400 CFU/m^3 and the mean TA is 320 CFU/m^3. The mean of all offsite AF measurements is 21 CFU/m^3 and all offsite TA measurements is 120 CFU/m^3.

There is limited data for Bellport and LIE Exit 69, however, all AF and TA bioaerosol measurements are below background benchmarks.

See Table 1 for a summary of the minimum and maximum fungi values recorded for each site. In addition, Appendices 1.0 to 1.4 list individual site data.

Table 1. Fungal Counts

Fungal Counts (CFU/m^3)					
Study Area	Downwind Min. – Max. (n**)	Upwind Min. – Max (n**)	Neither Upwind or Downwind Min. – Max. (n**)	Background* (CAM) Min. – Max (n**)	Comments
Global	115 – 8,675 (n=13)	<10 – 240 (n=8)	50-200 (n=4)	<10-185 (n=14)	
Great Gardens,	35 – 4,000 (n=14)	<10 – 323 (n=9)	<10-690 (n=13)	<10 – 185 (n=16)	64 % of down wind values >1000 CFU/m^3
Papermill	<10 – 2,575 (n=7) (on site) <10-35 (n=2) (off site)	NA	<10 -73 (n=6)	<10 – 20 (n=7)	Maximum downwind occurred on site during windrow turning
Bellport	<10 (n=1)	NA	30-45 (n=2)	<10 – 185 (n=3)	
LIE, Exit 69	20 – 75 (n=4)	NA	<10-<10 (n=3)	10 – 15 (n=3)	

NA = no samples taken
*Background = samples collected at continuous air monitoring trailer at Holtsville, NY.
**n = number of sampling events

See Table 2 for a summary of the minimum and maximum TA counts recorded for each site. In addition, Appendices 1.0 to 1.4 lists individual site data.

Table 2. Thermophilic Actinomycetes Counts

Thermophilic Actinomycetes Counts (CFU/m^3)					
Site	Downwind Min. – Max. (n**)	Upwind Min. – Max (n**)	Neither Upwind or Downwind Min. – Max (n**)	Background* (CAM) Min. – Max. (n**)	Comments
Global	<10 – 3,000 (n=13)	<10 – 358 (n=8)	70-340 (n=4)	<10 – 325 (n=14)	
Great Gardens,	10 – 3,965 (n=14)	<10 – 575 (n=9)	15 – 1,425 (n=12)	<10 – 325 (n=15)	
Papermill	40 – 785 (n=7) on site <10 -105 (n=2) off site	NA	17-450 (n=6)	25-250 (n=7)	Maximum downwind occurred on site during windrow turning
Bellport	25 (n=1)	NA	107-125 (n=2)	60 – 300 (n=3)	
LIE, Exit 69	25 – 300 (n=4)	NA	<10-165 (n=3)	10-238 (n=3)	

NA = no samples taken
*Background = samples collected at continuous air monitoring trailer at Holtsville, NY.
**n = number of sampling events

Particulate Matter

Results of $PM_{2.5}$ and PM_{10} particulate sampling at Global and Great Gardens show greater concentrations for downwind receptors when compared to sites that are upwind. There was limited sampling for PM_{10} due to availability of instruments.

See Table 3 for a summary of the minimum and maximum particulate values recorded for each site. In addition, appendices 1.0 to 1.4 list individual site data.

Table 3. Particulate Matter ($PM_{2.5}$)

Average $PM_{2.5}$ ($\mu g/m^3$)				
Study Area	Downwind Min. – Max. (n*).	Upwind Min. – Max. (n*)	Neither Upwind or Downwind Min. – Max. (n*)	Background** Min. – Max. (n*)
Global	6 - 103 (n=13)	6 - 18 (n=7)	13 - 59 (n=4)	5 - 39 (n=14)
Great Gardens	4 - 82 (n=14)	3 - 22 (n=9)	3 - 92 (n=13)	5 - 30 (n=17)
Papermill	3 – 25 (n=7) on site 3 – 8 (n=2) off site	NA	2 - 19 (n=6)	6 - 39 (n=7)
Bellport	7 (n=1)	NA	3 - 5 (n=2)	7 - 9 (n=3)
LIE Exit 69	5 - 45 (n=4)	NA	10 - 41 (n=3)	5 - 10 (n=3)

* n = number of 15-30 minute samples
** background = average on CAM hourly values
NA = no sample taken

Volatile Organic Compounds (VOCs)

Some of the VOCs detected in short-term grab samples (≤ 30 minutes) resulted in readings above the 95th percentile when compared to background 24-hour ambient air concentrations found at the CAM in Holtsville. See Table 4 for a summary of the findings.

Samples taken around the Great Gardens facility detected some VOCS above the 95th percentile when compared to background 24-hour ambient air concentrations found at the CAM site (ethanol, 2-propenal, 2-butanone, hexanal, octanal, nonanal, decanal). However, a background sample taken at the CAM site has similar concentrations of these VOCs and, in addition, these VOCs are also found in the upwind sample. This indicates the source of these VOCs may not be associated with the facility.

A sample taken downwind of the Global facility detected only 2-butanone, benzaldehyde and acetophenone and an asphalt like odor was noted at the time of sampling. Other types of industries (asphalt, cement, etc.) are located near the Global facility.

The onsite sample at the Papermill facility detected only propane at a level within the background range.

Specific site data on VOC analyses is not provided in this report.

Table 4. Ambient Air VOC Concentrations near Study Areas

Compound	Reported Range (≤ 30 min. collection time) ppb (v)	24 Hour Background Ambient Range (5th-95th percentile)* ppb (v)	Reported Range (≤ 30 min. collection time) ug/m3
Propane	<0.6 - 4.4	0.05 – 3.50	<1.1 - 7.9
Propylene	<0.6 – 1.9	<0.02 – 2.22	<1.0 – 3.3
Freon 12	0.4 – 1.1	<0.07 – 0.92	2.0 – 5.4
Freon 22	<0.2 – 0.3	<0.02 – 0.04	< 0.7 – 1.1
Freon 114	<0.2 – 0.1 (only positive)	<0.01 – 0.03	ND – 0.7
Methanol	3.7 – 44.4	<0.02 – 0.47	4.8 – 58.2
Butane	<0.5 – 1.8	<0.16 – 8.23	< 1.2 – 4.3
Ethanol	<1.0 – 10.2	0.13 – 2.03	< 1.9 – 19.2
Freon 11	<0.3 – 0.4	0.06 – 0.36	< 1.7 – 2.2
2- Propenal	<0.4 – 2.0	<0.01 – 0.26	< 0.9 – 4.6
Isopropanol	<0.5 – 0.9	<0.02 – 0.54	< 1.2 – 2.2
Acetonitrile	<0.5 – 0.2 (only positive)	<0.02 – 0.31	ND – 0.3
2-Butanone	0.3 – 1.0	<0.01 – 0.42	0.9 – 2.9
2- Propenenitrile	ND – 0.1 (only positive)	<0.01 – 0.01	ND – 0.03
Toluene	<0.2 – 0.9	0.08 – 0.77	< 0.8 – 3.4
Vinyl Acetate	ND – 0.5 (only positive)	<0.1 - <0.1	ND – 0.5
Hexanal	0.4 – 2.0	<0.01 – 0.01	1.6 – 8.2
Carbon Tetrachloride	<0.2 – 0.2 (only positive)	0.02 – 0.16	< 1.3 – 1.3
Tetrahydrofuran	<0.2 – 0.6(only positive)	<0.01 – 0.18	0.6 – 1.8
m,p-Xylene	<0.2 – 0.8	0.03 - 0.69	< 0.9 – 3.5
2- Methylnapthalene	<0.2 – 1.0	<0.01 – 0.09	< 1.2 – 5.8
1-Methylnaphthalene	<0.2 – 0.3(only positive)	<0.01 – 0.04	< 0.2 – 0.3
Benzaldehyde	1.9 – 2.1	<0.02 – 0.20	8.3 – 9.1
Octanal	0.3 – 1.3	<0.01 – 0.10	1.5 – 6.8
Phenol	<0.6 – 2.4	<0.01 – 0.14	< 2.3 – 9.2
Nonanal	0.9 – 5.5	<0.02 - <0.02	5.2 – 32.0
Acetophenone	1.2 – 2.0	<0.01 – 0.33	5.9 – 9.8
Decanal	1.8 – 9.5	<0.04 – 0.07	11.5 – 60.7

* Ambient values represent 24-hour composite air samples collected every 6th day, at Sagamore Middle School, Holtsville, New York, EPA/Airs site code 36-103-0009. Values reported by Suffolk County Public & Environmental Health Laboratory (PEHL).

Additional non-target compounds were detected which have been identified by other studies to be in emissions from composting/mulching operations. However, these compounds were not confirmed due to limitation of manpower and time.

Hydrogen Sulfide

Hydrogen sulfide, H2S, measurements show no apparent air quality impact from facility emissions. Concentrations range from < 0.001 ppm to a maximum 0.001 ppm.

Table 5. Ambient Air Hydrogen Sulfide Concentrations near Study Areas

Date	Study Areas	H_2S Conc.
4/2/08	Ambient at CAM background site, 57 Division St., Holtsville NY 148 Beaverdam Rd., Bellport NY (Global) 138 Yaphank Ave., Yaphank NY (Great Gardens)	<0.001 ppm <0.001 ppm <0.001 ppm
4/18/08	Ambient at CAM background site, 57 Division St., Holtsville NY Between windrows, Papermill Rd, Manorville (Papermill) S.of Bldg.# 167, Firematics, Yaphank (Great Gardens)	<0.001 ppm <0.001 ppm 0.001 ppm
5/7/08	Ambient at CAM background site, 57 Division St., Holtsville NY Between windrows, Papermill Rd, Manorville (Papermill) Montauk Hwy, SE of Brookhaven Brake, (Global)	<0.001 ppm <0.001 ppm <0.001 ppm
5/30/08	Ambient at CAM background site, 57 Division St., Holtsville NY. S. of Bldg.# 167, Firematics, Yaphank (Great Gardens) Between windrows, Papermill Rd, Manorville (Papermill)	<0.001 ppm <0.001 ppm 0.001 ppm
6/11/08	Ambient at CAM background site, 57 Division St., Holtsville NY 144 Beaverdam Rd., Bellport NY (Global)	<0.001 ppm 0.001 ppm
6/25/08	Ambient at CAM background site, 57 Division St., Holtsville NY S. of Bldg.# 167, Firematics, Yaphank (Great Gardens) Montauk Hwy, SE of Brookhaven Brake, (Global)	<0.001 ppm <0.001 ppm <0.001 ppm
7/30/08	Ambient at CAM background site, 57 Division St., Holtsville NY Montauk Hwy, SE of Brookhaven Brake, (Global) Between turned windrows, Papermill Rd, Manorville (Papermill)	<0.001 ppm 0.001 ppm <0.001 ppm
9/4/08	Ambient at CAM background site, 57 Division St., Holtsville NY S.of Bldg.# 167, Firematics, Yaphank (LI Great Gardens Compost) First Student Bus Depot, 34 Arthur Av., Bellport (Global)	<0.001 ppm 0.001 ppm 0.001 ppm
10/3/08	Ambient at CAM background site, 57 Division St., Holtsville NY At entrance gate, Yaphank Av. Sump, Yaphank (Great Gardens) 1st Student Bus, Park Lot, 34 Arthur Av., Bellport (Global)	<0.001 ppm <0.001 ppm <0.001 ppm

Carbon Dioxide and Carbon Monoxide

On several occasions, downwind CO_2 concentrations were observed to be higher than the upwind concentrations. The maximum downwind concentration recorded during this study was 590 ppm.

Carbon monoxide (CO) measurements recorded showed no apparent impact from compost emissions at downwind fence-line receptors. Almost all CO readings recorded during this study, including upwind and downwind concentrations, were similar to background readings of ≤ 0.1 ppm. The maximum downwind CO concentration recorded during this study was 1.3 ppm.

There appears to be no correlation between fungus levels above 1000 CFU/m^3 and CO and CO_2 concentrations.

See Appendix 2 for a comparison of sampling events having fungus levels >1000 CFU/m^3 with CO and CO_2 determinations.

Odor Monitoring

Community "sniff tests" were performed from August 27, 2007 to January, 2009. These visits were random or in response to complaints. Sniff test were performed at various sites within the each study areas.

Table 6. Summary of "Sniff Test" Results for Study Areas

Study Area	Number of days compost like odor detected in community	Number of days no compost like odors detected in community
Global (total 11 "sniff tests")	1	2
Great Gardens (total 107 "sniff tests")	21	6
Papermill (total 20 "sniff test")	1	3
Bellport (total 16 "sniff tests)"	1	6
LIE Exit 69 (total 41 "sniff tests")	6	8

Forty-one odor "sniff tests" were conducted at downwind locations during air quality sampling events. Odors were detected more than 90% of the time at the downwind monitoring sites.

4) Discussion and Conclusions

Odors were detected on numerous occasions at various sites primarily downwind. This study has documented that odors from facilities are being carried into residential areas. At times, staff found the odors to be quite objectionable and, on one occasion, so intense that they began to feel nauseous. It is worthy to note that staff observed that odors subsided when heavy processing equipment was shut down. It may be worthwhile to assess this equipment as a point source of the odors. If this was found to be true, the application of engineering controls may result in the minimization of objectionable odors.

Data collected during this study showed a potential correlation between elevated levels of contaminants in the air samples and the presence of odors. This reinforces the assertion that the use of "odor monitoring" as suggested by NYSDEC staff is a valid option and could be used for enforcement purposes as per 6NYCRR 211.2 "No person shall cause or allow emissions of air contaminants to the outdoor atmosphere of such quantity, characteristic or duration which are injurious to human, plant or animal life or to property, or which unreasonably interfere with the comfortable enjoyment of life or property. Notwithstanding the existence of specific air quality standards or emission limits, this prohibition applies, but is not limited to, any particulate, fume, gas, mist, odor, smoke, vapor, pollen, toxic or deleterious emission, either alone or in combination with others."

Results indicate the Bellport facility did not contribute significant odors or levels of air contaminants. Analytical data was limited for this study area, but based on the limited size and nature of the operation (leaves left intact to compost), the facility does not appear to pose concerns. This study area was included due to a history of offsite nuisance issues. However, these concerns could not be verified during the study.

During the collection of air samples in the area near the Bellport study facility on Wards Lane, another source of odors was discovered emanating from the Global facility on Arthur Avenue in Brookhaven Town. Global was not included as a targeted study area in the original legislation. It is permitted by NYSDEC to accept uncontaminated concrete, asphalt payment, brick, soil and unadulterated wood and is approximately 1500 feet northeast of the resident most frequently complaining about the Bellport study area. The Village of Bellport compost facility is approximately 100 feet south of this same residence, however, during all of the sampling events or odor monitoring visits in front of this residence or the leaf compost facility, a slight odor was only noted once.

Strong compost-like odors were noted downwind of the Global facility, especially in the residential area across the street along Beaverdam Road. It might be possible that the residents on Wards Lane are detecting the odors from the Global facility if the wind direction is from the northeast. The odors were most notable when grinding equipment was being used to process trees, shrubs, etc. to produce what is assumed to be mulch. A similar observation was made when mechanical compost processing equipment was operating at the Great Gardens facility. On one occasion, it was noted that odors stopped within minutes of processing equipment being shut down.

Overall, average $PM_{2.5}$ concentrations obtained during this study ranged from 3 $\mu g/m^3$ to 103 $\mu g/m^3$ for downwind sites, whereas upwind sites ranged from 3 $\mu g/m^3$ to 22 $\mu g/m^3$, sites perpendicular to wind direction ranged from 2 $\mu g/m^3$ to 92 $\mu g/m^3$ and the background site ranged from 5 $\mu g/m^3$ to 39 $\mu g/m^3$. Results for $PM_{2.5}$ particulate sampling at Global and Great Gardens facilities show greater concentrations for downwind sites when compare to sites that are upwind. These results indicate a trend towards at least transient increases in $PM_{2.5}$ above ambient levels associated with facility emissions.

Overall, fungal counts ranged from <10 CFU/m^3 to 8,675 CFU/m^3 for sites downwind of yard waste management facilities, from <10 CFU/m^3 to 323 CFU/m^3 for upwind sites, and <10 CFU/m^3 to 185 CFU/m^3 for the background site. TA values ranged from <10 CFU/m^3 to 3,965 CFU/m^3 for sites downwind of study facilities, <10 CFU/m^3 to 575 CFU/m^3 for upwind sites, and <10 CFU/m^3 to 325 CFU/m^3 for the background site. Results for bioaerosols sampling at Global and Great Gardens facilities show greater bioaerosol (AF and TA) concentrations for downwind sites when compare to sites that are upwind. These results are consistent with the $PM_{2.5}$ trends suggesting facility emissions are contributing to at least transient increased bioaerosol levels in the downwind direction.

Based on limited data and site visits, the Papermill facility appeared to generally well managed. The single sampling event with an elevated Aspergillus count was collected onsite and occurred when windrows were being turned. The Papermill facility was the only facility where several of the measurements were made on site, due to access, as well as the ability to capture potential worse case conditions. This study area was included due to a history of offsite nuisance issues. However, these concerns could not be verified during the study.

Although relatively limited analytical data is available for the LIE Exit 69 study area, odors were detected almost half of the days "sniff tests" were conducted and when analytical samples were taken. All bioaerosol measurements are below the background bench mark of 350 CFU/m^3 and mean $PM_{2.5}$ is lower downwind when compared to other sites.

This investigation also included a limited number of measurements of VOCs at sites near the study areas. Of the VOCs determined, several were reported at concentrations greater than the 95^{th} percentile of background ambient air concentrations recorded at the CAM trailer in Holtsville, NY. However, these comparisons are complicated by the short–term grab samples ($\leq$ 30 minutes) collected during the study in contrast to the 24 hour average air concentrations recorded at the CAM. The VOCs measurements do not indicate a likely influence from facility emissions on air quality.

The study also showed little or no impact from yard waste processing operations at downwind receptors for H_2S, CO or CO_2.

This data gathering study has several limitations. There is limited data for each site due to the number of study areas being investigated, availability of sampling personnel and equipment. Data collection efforts were limited to relatively short-term grab samples and therefore cannot assess longer-term average air quality levels. Odor events and excursions in particulate matter emissions can be of short duration, infrequent and episodic and may not have been captured during this study. Odor detection was subjective and there was no assessment of an individual's ability to identify odors or standardization of recording odor observations. Nevertheless, a fairly extensive data set of upwind, background and downwind observations allowed investigation of the relative contribution of facility emissions to changes in local air quality.

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Appendix 1.0

Air Quality Data from Study Area around Global Land Material, Arthur Ave, Bellport N.Y.

Date And Time	Sampling Location	Relation to Compost Site	Odor Intensity	Fungus CFU/m^3	Bacteria CFU/m^3	Wind Speed mph	Wind Direction Degrees	PM_{10} min-max $\mu g/m^3$	$PM_{2.5}$ min-max $\mu g/m^3$	$PM_{2.5}$ Aver. $\mu g/m^3$	Comments
10/3/08 9:43	Bus Depot, 34Arthur Av	Downwind	Medium	170	850	4	228°	65-350	9-42	20	
10/3/08 11:01	Montauk Hwy., SE of Brookhaven Brake	Neither	None[B]	90	225	6	250°	55-134	27-127	59	
10/3/08 14:37	CAM[A]	Background	None	<10	25	Calm	Variable	NA	8-12	10	
9/4/08 10:26	Bus Depot, 34Arthur Av	Neither	Weak-Medium	200	340	Calm	Var-238°	7-128	44-70	56	
9/4/08 11:21	SE of Brookhaven Brk	Downwind	Weak	410	380	5	230°	30-200	56-78	65	
9/4/08 14:26	CAM	Background	None	15	115	4	187	NA	21-39	30	
7/30/08 13:34	Montauk Hwy., SE of Brookhaven Brake	Downwind	Strong	3,030	3,000	3	140°	168-391	65-192	103	
7/30/08 14:46	148 Beaverdam Rd.	Upwind	None	48	333	Calm	Variable	NA	NA	NA	
7/30/08 15:43	CAM	Background	None	20	140	3	165°	NA	29-47	39	
6/25/08 11:16	144 Beaverdam Rd.	Upwind	None	<10	160	Calm	Variable	10-16	7-11	9	
6/25/08 12:13	SE of Brookhaven Brk	Downwind	Medium	2,335	1,700	5	230°	42-103	8-23	14	
6/25/08 15:14	CAM	Background	None	160	325	4	195	NA	9-22	13	
6/11/08 9:56	144 Beaverdam Rd.	Downwind	Medium	865	920	Calm	Var-20°	4-133	8-25	13	
6/11/08 11:02	SE of Brookhaven Brk	Upwind	None	77	355	4	290°	8-77	8-28	13	
6/11/08 15:30	CAM	Background	None	<10	185	3	317	NA	2-26	14	

[A] Data collected at the Suffolk County continuous air monitoring (CAM) trailer located at the Sagamore Middle School, 57 Division Street, Holtsville, N.Y.
[B] Asphalt odor detected, no compost odor present

Appendix 1.0 (continued)

Air Quality Data from Study Area around Global Land Material, Arthur Ave, Bellport N.Y.

Date And Time	Sampling Location	Relation to Compost Site	Odor Intensity	Fungus CFU/m	Bacteria CFU/m^3	Wind Speed mph	Wind Direction Degrees	PM_{10} min-max $\mu g/m^3$	$PM_{2.5}$ min-max $\mu g/m^3$	$PM_{2.5}$ Aver. $\mu g/m^3$	Comments
5/7/08 13:24	Montauk Hwy., SE of Brookhaven Brake	Downwind	Strong - medium	685	2,150	4	230°	11-167	16-56	32	
5/7/08 14:19	148 Beaverdam Rd.	Upwind	None	13	205	Calm	Var-230°	13-30	<1-14	6	
5/7/08 16:47	CAM[A]	Background	None	17	55	7	172°	NA	5-10	7	
4/2/08 10:00	148 Beaverdam Rd.	Downwind	Medium	735	50	4	330°	8-41	7-15	10	
4/2/08 11:20	SE of Brookhaven Brk	Upwind	None	<10	50	5	320°	8-43	8-29	16	
4/2/08 15:12	CAM	Background	None	30	150	7	306	NA	2-12	7	
3/13/08 12:42	SE of Brookhaven Brk	Downwind	Strong - medium	8,675	425	4	145°	3-114	7-19	9	
3/13/08 14:41	CAM	Background	None	<10	300	8	169°	NA	4-13	9	
1/31/08 14:02	148 Beaverdam Rd.	Downwind	Intermittent None	250	1,300	Calm	Variable	3-112	14-24	17	
1/31/08 15:10	SE of Brookhaven Brk	Upwind		<10	358	Calm	Var-315°	NA	13-25	18	
1/31/08 16:00	CAM	Background	None	50	<10	4	4°	NA	3-11	9	
1/16/08 13:21	146 Beaverdam Rd.	Downwind	Medium[B]	115	<10	6	320°	2-32	<1-18	6	VOC sample
1/16/08 14:43	SE of Brookhaven Brk	Upwind	None	<10	<10	5	315°	2-87	4-22	8	
1/16/08 15:45	CAM	Background	None	13	<10	5	304°	NA	2-7	5	

A Data collected at the Suffolk County Continuous Air Monitoring (CAM) trailer, located at Sagamore Middle School, 57 Division St., Holtsville N.Y.

Appendix 1.0 (continued)

Air Quality Data from Study Area around Global Land Material, Arthur Ave, Bellport N.Y.

Date And Time	Sampling Location	Relation to Compost Site	Odor Intensity	Fungus CFU/m^3	Bacteria CFU/m^3	Wind Speed mph	Wind Direction Degrees	PM_{10} min-max $\mu g/m^3$	$PM_{2.5}$ min-max $\mu g/m^3$	$PM_{2.5}$ Aver. $\mu g/m^3$	Comments
11/8/07 11:10	124 Beaverdam Rd.	Downwind	Intermittent None	165	100	Calm	Variable	4-11	5-8	6	
11/8/07 12:57	Montauk Hwy., SE of Brookhaven Brake	Upwind		240	215	Calm	Variable	4-35	6-26	11	
11/8/07 15:50	CAM[A]	Background	None	<10	15	Calm	Variable	NA	2-8	6	
10/16/07 10:38	130 Beaverdam Rd.	Downwind	Present	1,400	130	5	15°	5-30	4-23	14	
10/16/07 11:37	SE of Brookhaven Brk	Neither	None	50	70	Calm	Variable°	6-105	4-41	13	
10/16/07 14:53	CAM	Background	None	185	60	Calm	Variable	NA	5-8	7	
9/28/07 13:58	124 Beaverdam Rd.	Neither	Intermittent None	190	305	Calm	Var-283°	24-41	17-39	25	
9/28/07 14:37	CAM	Background		15	20	4	310°	NA	5-12	9	
9/6/07 14:02	SE of Brookhaven Brk.	Downwind	Present	260	190	5	173°	6-92	5-60	11	
9/6/07 15:25	CAM	Background	None	40	157	6	165°	NA	3-10	7	

A Data collected at the Suffolk County Continuous Air Monitoring (CAM) trailer, located at Sagamore Middle School, 57 Division St., Holtsville N.Y.

Appendix 1.1

Air Quality Data from Study Area around Great Gardens LLC, Horseblock Road, Yaphank N.Y.

Date And Time	Sampling Location	Relation to Compost Site	Odor Intensity	Fungus CFU/m^3	Bacteria CFU/m^3	Wind Speed mph	Wind Direction Degrees	PM_{10} min-max $\mu g/m^3$	$PM_{2.5}$ min-max $\mu g/m^3$	$PM_{2.5}$ Aver. $\mu g/m^3$	Com-ments
10/3/08 12:30	138 Yaphank Ave.	Neither	Medium - intermittent	70	700	Calm	Var-260°	24-92	10-51	19	
10/3/0813:35	Yaphank Ave Sump	Neither	Weak	125	350	Calm	Var-220°	10-26	8-12	11	
10/3/08 14:37	CAM[A]	Background	None	<10	25	Calm	Variable	NA	8-12	10	
9/4/08 12:36	138 Yaphank Ave.	Neither	None	150	550	Calm	Variable	95-170	79-106	92	
9/4/08 13:32	Firematics, Bldg 167 (S. of Maint. Garage)	Downwind	Med.-Weak	1,225	660	Calm	Variable	71-117	72-94	82	
9/4/08 14:26	CAM	Background	None	15	115	4	187	NA	21-39	30	
6/25/08 10:13	138 Yaphank Ave.	Neither	Med.-Weak	560	600	<3-4	Var-240°	25-98	12-62	19	
6/25/08 14:01	Firematics, Bldg 167 (S. of Maint. Garage)	Downwind	Medium (rancid)	4,000	3,965	<3-6	Var-190°	12-65	12-21	16	
6/25/08 15:14	CAM	Background	None	160	325	4	197°	NA	9-22	13	
5/30/08 12:18	138 Yaphank Ave.	Neither	None	255	1,425	<3-5	Variable	9-43	11-25	16	
5/30/08 13:15	Firematics, Bldg 167 (S. of Maint. Garage)	Downwind	Strong	2,000	1,425	<3-7	185°	46-106	13-32	18	
5/30/08 14:32	CAM	Background	None	10	250	5	165°	NA	3-19	11	
4/18/08 14:16	Firematics, Bldg 167 (S. of Maint. Garage)	Downwind	Weak-Med	540	3,000	4	170-210°	8-91	23-45	31	
4/18/08 15:13	138 Yaphank Ave.	Neither	None	10	550	<3-5	Var-186°	36->249	19-59	31	
4/18/08 16:08	CAM	Background	None	<10	120	4	197°	NA	13-18	17	

[A] Data collected at the Suffolk County Continuous Air Monitoring (CAM) trailer, located at Sagamore Middle School, 57 Division St., Holtsville N.Y.

Appendix 1.1 (continued)

Air Quality Data from Study Area around Great Gardens LLC, Horseblock Road, Yaphank N.Y.

Date And Time	Sampling Location	Relation to Compost Site	Odor Intensity	Fungus CFU/m^3	Bacteria CFU/m^3	Wind Speed mph	Wind Direction Degrees	PM_{10} min-max $\mu g/m^3$	$PM_{2.5}$ min-max $\mu g/m^3$	$PM_{2.5}$ Aver. $\mu g/m^3$	Com-ments
4/2/08 12:37	Firematics Parking Lot (North/of Bldg.676)	Upwind	None	<10	10	3-11	325-345°	7-75	7-10	9	
4/2/08 13:25	138 Yaphank Ave.	Downwind	Medium-Strong	35	360	Calm	Var. 330-360°	10-25	6-11	9	
4/2/08 15:12	CAM[A]	Background	None	30	150	7	306°	NA	2-12	7	
3/13/08 9:52	138 Yaphank Ave.	Neither	Intermittent	<10	15	<3-5	310-350°	1-11	4-7	5	
3/13/08 11:04	Firematics Parking Lot (North/of Bldg.676)	Upwind	None	<10	140	Calm	Variable	6-16	3-7	5	
3/13/08 14:41	CAM	Background	None	<10	300	8	169	NA	4-13	9	
1/31/08 11:22	138 Yaphank Ave.	Downwind	Intermittent	2,250	10	3-8	300-340°	15-87	13-16	15	VOC sample
1/31/08 12:32	Firematics Parking Lot (North/of Bldg.676)	Upwind	None	<10	575	<3-5	270-330°	14-25	14-18	16	
1/31/08 16:00	CAM	Background	None	50	<10	3-4	351-4°	NA	3-11	9	
1/16/08 10:27	138 Yaphank Ave.	Downwind	Strong	1,150	<10	5-8	300-340°	3-12	<1-6	4	
1/16/08 11:28	Firematics, N. of Sump (near bldg. 811)	Upwind	None	18	<10	Calm	320-350°	2-15	1-4	3	
1/16/08 15:45	CAM	Background	None	13	NA	4	304°	NA	2-7	5	
11/8/07 14:00	138 Yaphank Ave.	Downwind	Medium	1,730	210	<3-5	Var-325°	7-14	6-10	8	
11/8/07 15:00	Firematics, North of Drainage Sump	Upwind	None	50	<10	3-4	Var (290-40)°	6-13	6-10	8	
11/8/07 15:50	CAM	Background	None	<10	15	5	Variable	NA	2-8	6	

[A] Data collected at the Suffolk County Continuous Air Monitoring (CAM) trailer, located at Sagamore Middle School, 57 Division St., Holtsville N.Y.

Appendix 1.1 (continued)

Air Quality Data from Study Area around Great Gardens LLC, Horseblock Road, Yaphank N.Y.

Date And Time	Sampling Location	Relation to Compost Site	Odor Intensity	Fungus CFU/m^3	Bacteria CFU/m^3	Wind Speed mph	Wind Direction Degrees	PM_{10} min-max µg/m^3	$PM_{2.5}$ min-max µg/m^3	$PM_{2.5}$ Aver. µg/m^3	Comments
10/16/07 13:28	Firematics, N. of Sump (near bldg. 811)	Neither	None	20	160	Calm	Var-270°	<1-71	3-5	4	
10/16/07 14:06	138 Yaphank Ave.	Downwind	Strong	1,370	1,350	7	270-300°	<1-125	6-24	16	
10/16/07 14:53	CAM[A]	Background	None	185	60	Calm	Variable	NA	5-8	7	
9/2807 11:41	138 Yaphank Ave.	Downwind	Present	2,000	325	4	291°	18-92	18-33	24	
9/28/0714:57	Firematics, N. of Sump (near bldg. 811)	Upwind	None	323	210	6	314°	27-36	20-24	22	
9/28/07 15:37	CAM	Background	None	15	20	4	317	NA	5-12	9	
9/6/07 11:14	Firematics, N. of Sump (near bldg. 811)	Downwind	Present	2,750	440	9	171°	3-55	6-24	10	
9/6/07 11:59	138 Yaphank Ave.	Neither	None	107	190	Calm	Variable	2-28	3-10	6	
9/6/07 15:25	CAM	Background	None	40	157	8	170°	NA	3-10	6	
8/17/07 11:48	138 Yaphank Ave.	Neither	Intermit-tent	92	350	Calm	Variable	NA	8-20	13	CAM not sampled- Biotest Battery problem
8/17/07 14:34	Firematics, Bldg 167 (S. of Maint. Garage)	Neither	Intermit-tent	690	NA	Calm	Variable	10-45	23-39	31	
8/17/07 15:20	CAM	Background	None	NA	NA	3	173°	NA	10-23	15	
8/9/07 12:05	138 Yaphank Ave.	Upwind	None	10	15	<3-7	Variable	NA	1-6	3	
8/9/07 13:00	Firematics, Bldg 167 (S. of Maint. Garage)	Neither	None-weak	15	35	Calm	Variable	2-25	1-5	3	
8/09/07 15:15	Firematics, S/E of STP	Downwind	Present	515	2,350	3-6	114°	<1-70	1-12	5	VOC sample
8/9/07 16:18	CAM	Background	None	70	35	4	143°	NA	3-11	6	

[A] Data collected at the Suffolk County Continuous Air Monitoring (CAM) trailer, located at Sagamore Middle School, 57 Division St., Holtsville N.Y.

Appendix 1.1 (continued)

Air Quality Data from Study Area around Great Gardens LLC, Horseblock Road, Yaphank, N.Y.

Date And Time	Sampling Location	Relation to Compost Site	Odor Intensity	Fungus CFU/m^3	Bacteria CFU/m^3	Wind Speed mph	Wind Direction Degrees	PM_{10} min-max $\mu g/m^3$	$PM_{2.5}$ min-max $\mu g/m^3$	$PM_{2.5}$ Aver. $\mu g/m^3$	Comments
7/27/07 10:12	138 Yaphank Ave.	Upwind	None	50	120	Calm	Variable	13-29	11-20	15	
7/27/07 12:29	Firematics, Bldg 167 (S. of Maint. Garage)	Downwind	Intermit-tent	220	985	3	193°	NA	9-40	23	VOC sample
7/27/07 14:03	CAM[A]	Background	None	10	70	6	167°	NA	<1-23	7	
7/13/07 12:10	138 Yaphank Ave.	Upwind	None	100	363	6	174°	NA	16-27	22	VOC sample
7/13/07 14:07	Firematics, Yaphank Av Sump/E. of LI Compost	Neither	Present	360	645	5	189°	NA	15-33	25	VOC sample
7/13/07 15:43	Firematics, Bldg 167 (S. of Maint. Garage)	Downwind	Present	960	958	2-5	Var-190°	NA	21-47	38	VOC sample
7/13/07 17:27	CAM	Background	None	20	103	4	188°	NA	21-38	28	VOC sample

[A] Data collected at the Suffolk County Continuous Air Monitoring (CAM) trailer, located at Sagamore Middle School, 57 Division St., Holtsville N.Y.

Appendix 1.2

Air Quality Data from Study Area around Manorville Yard Waste Composting Facility, Papermill Road, Manorville

Date And Time	Sampling Location	Relation to Compost Site	Odor Intensity	Fungus CFU/m^3	Bacteria CFU/m^3	Wind Speed mph	Wind Direction Degrees	PM_{10} min-max $\mu g/m^3$	$PM_{2.5}$ min-max $\mu g/m^3$	$PM_{2.5}$ Aver. $\mu g/m^3$	Comments
7/30/08 10:08	Manorville Yard Waste Composting Facility, (on site)	Downwind	Medium	2,575	335	4-6	140°	8-42	17-38	25	Windrows being turned while sampling
7/30/08 11:40	18 Charter Court	Neither	None	35	48	Calm	Variable	NA	17-20	19	
7/30/08 15:43	CAM[A]	Background	None	20	140	3	165°	NA	29-47	39	
6/11/08 12:54	Manorville Yard Waste Composting Facility, (on site)	Downwind	Medium	70	400	6	290°	7-37	5-9	7	
6/11/08 13:50	1 Gloria Road	Downwind	None	35	105	<3-6	340°	5-15	6-10	8	
6/11/08 15:30	CAM	Background	None	<10	185	3	317°	NA	2-26	14	
5/30/08 9:26	Manorville Yard Waste Composting Facility, (on site)	Downwind	Weak-none	25	785	4	260°	4-33	4-8	5	
5/30/08 10:24	18 Charter Court	Neither	None	73	450	<3-4	Variable°	5-64	10-15	13	
5/30/08 14:32	CAM	Background	None	10	250	5	165°	NA	3-19	11	
5/7/08 10:26	Manorville Yard Waste Composting Facility, (on site)	Downwind	Weak	60	250	<3-5	Var-340°	4-542	11-15	13	
5/7/08 11:43	Deerfield Court	Neither	None	<10	17	<3-8	210°	19-24	11-16	13	
5/7/08 16:47	CAM	Background	None	17	55	7	172°	NA	5-10	7	

[A] Data collected at the Suffolk County Continuous Air Monitoring (CAM) trailer, located at Sagamore Middle School, 57 Division St., Holtsville N.Y

Appendix 1.2 (continued)

Air Quality Data from Study Area around Manorville Yard Waste Composting Facility, Papermill Road, Manorville

Date And Time	Sampling Location	Relation to Compost Site	Odor Intensity	Fungus CFU/m^3	Bacteria CFU/m^3	Wind Speed mph	Wind Direction Degrees	PM_{10} min-max $\mu g/m^3$	$PM_{2.5}$ min-max $\mu g/m^3$	$PM_{2.5}$ Aver. $\mu g/m^3$	Comments
4/18/08 10:21	Manorville Yard Waste Composting Facility, (on site)	Downwind	Weak	<10	170	Calm	Variable	17-200	11-34	18	Agar media used for Fungal Counts is of questionable quality
4/18/08 12:02	18 Charter Court	Neither	None	<10	200	Calm	Variable	16-53	17-20	19	
4/18/08 16:08	CAM	Background	None	<10	120	4	197°	NA	13-18	17	
3/6/08 12:57	Manorville Yard Waste Composting Facility,(on site)	Downwind	Medium	<10	250	4-8	130°	8-16	8-16	10	
3/6/08 14:43	18 Charter Court	Neither	None	<10	50	<3-3	Var-190°	11-20	10-13	12	
3/6/08 15:53	CAM[A]	Background	None	<10	25	5	158°	NA	4-11	8	
9/13/07 10:10	20 Manorage Road	Downwind	None	<10	<10	<3-3	Var-338°	<1-14	1-5	3	
9/13/07 10:58	31 Windcrest Drive	Neither	None	<10	70	Calm	Var-298°	<1-7	1-5	2	
9/13/07 11:54	Manorville Yard Waste Composting Facility, (on site)	Downwind	Present	90	40	3	349°	<1-7	1-4	3	
9/13/07 14:14	CAM	Background	None	13	75	4	170	NA	2-10	6	

[A] Data collected at the Suffolk County Continuous Air Monitoring (CAM) trailer, located at Sagamore Middle School, 57 Division St., Holtsville N.Y

Appendix 1.3

Air Quality Data from Study Area around Village of Bellport Composting Facility, Wards Lane, Bellport, N.Y.

Date And Time	Sampling Location	Relation to Compost Site	Odor Intensity	Fungus CFU/m^3	Bacteria CFU/m^3	Wind Speed mph	Wind Direction Degrees	PM_{10} min-max $\mu g/m^3$	$PM_{2.5}$ min-max $\mu g/m^3$	$PM_{2.5}$ Aver. $\mu g/m^3$	Comments
3/13/08 13:37	64 Wards Lane	Downwind	None	<10	25	7	225°	5-71	6-9	7	
3/13/08 14:41	CAM[A]	Background	None	<10	300	8	169°	NA	4-13	9	
10/16/07 12:13	64 Wards Lane	Neither	None	30	125	Calm	Variable	<1-70	1-5	3	
10/16/07 14:53	CAM	Background	None	185	60	Calm	Variable	NA	5-8	7	
9/6/07 13:18	64 Wards Lane	Neither	None	45	107	4	168°	9-30	3-8	5	
9/6/07 15:25	CAM	Background	None	40	157	6	165°	NA	3-10	7	

[A] Data collected at the Suffolk County Continuous Air Monitoring (CAM) trailer, located at Sagamore Middle School, 57 Division St., Holtsville N.Y

Appendix 1.4

Air Quality Data from Study Area around Long Island Compost Company (Farm Fields), LIE/Exit 69, Manorville N.Y.

Date And Time	Sampling Location	Relation to Compost Site	Odor Intensity	Fungus CFU/m^3	Bacteria CFU/m^3	Wind Speed mph	Wind Direction Degrees	PM_{10} min-max $\mu g/m^3$	$PM_{2.5}$ min-max $\mu g/m^3$	$PM_{2.5}$ Aver. $\mu g/m^3$	Com-ments
12/20/07 10:44	South St. Elementary School	Neither	None	<10	<10	5	314°	44-52	36-44	41	
12/20/07 11:53	South St., 500 ft. west of Wading River Rd.	Downwind	Intermittent	25	25	7	288°	33-72	28-54	45	
12/20/07 14:50	CAM[A]	Background	None	10	10	7	335	NA	7-14	10	
9/13/07 13:26	LIE exit 69, Westbound entrance ramp	Downwind	Strong	40	300	5	8°	3-283	1-42	9	Piles being turned.
9/13/07 14:14	CAM	Background	None	13	75	4	170°	NA	2-10	6	
8/28/07 10:16	LIE exit 69, Eastbound exit ramp	Neither	None	<10	165	Calm	Variable	10-27	3-26	10	
8/28/07 11:23	South St. Elementary School	Neither	None	<10	<10	Calm	Variable	9-20	10-20	12	
8/28/07 12:00	Intersection of North St. and South St.	Downwind	None-Intermittent[B]	75	55	4	51°	12-24	10-19	13	horses?
8/28/07 13:10	LIE exit 69, Westbound entrance ramp	Downwind	Intermittent	20	80	NA	NA	NA	2-8	5	
8/28/07 14:39	CAM	Background	None	15	238	5	165	NA	2-7	5	

[A] Data collected at the Suffolk County Continuous Air Monitoring (CAM) trailer, located at Sagamore Middle School, 57 Division St., Holtsville N.Y

[B] Intermittent horse related odor only

Appendix 2

Data for Carbon Monoxide and Carbon Dioxide from Sampling Events having a fungus level >1000 CFU/m^3

Date And Time	Study Area: Sampling Location	Relation to Compost Site	Odor Intensity	Fungus CFU/m^3	Bacteria CFU/m^3	Wind Speed mph	Wind Direction Degrees	CO_2 min-max ppm	CO min-max[A] ppm	Comments
3/13/08 12:42	Global Land Materials: Montauk Hwy., SE of Brookhaven Brake	Downwind	Strong-medium	8,675	425	4	145°	335-364	<0.1-<0.1	
3/13/08 14:41	CAM	Background	None	<10	300	8	169°	NA	<0.1	
7/30/08 13:34	Global Land Materials: Montauk Hwy., SE of Brookhaven Brake	Downwind	Strong	3,030	3,000	3	140°	508-590	>0.1-0.6	CO and CO_2 slightly higher downwind
7/30/08 14:46	148 Beaverdam Rd.	Upwind	None	48	333	Calm	Variable	452-481	<0.1-<0.1	
7/30/08 15:43	CAM	Background	None	20	140	3	165°	NA	<0.1	
6/25/08 11:16	Global Land Materials: 144 Beaverdam Rd.	Upwind	None	<10	160	Calm	Variable	433-463	<0.1-<0.1	
6/25/08 12:13	SE of Brookhaven Brk	Downwind	Medium	2,335	1,700	5	230°	439-492	<0.1-<0.1	
6/25/08 15:14	CAM	Background	None	160	325	4	195	NA	0.1	
10/16/07 10:38	Global Land Materials: 130 Beaverdam Rd.	Downwind	Present	1,400	130	5	15°	404-419	<0.1-0.2	
10/16/07 11:37	SE of Brookhaven Brk	Upwind	None	50	70	Calm	Variable	433-447	<0.1-<0.1	
10/16/07 14:53	CAM	Background	None	185	60	Calm	Variable	NA	0.1	

[A] CO values for CAM represent hourly averages.

Appendix 2 (continued)

Data for Carbon Monoxide and Carbon Dioxide from Sampling Events having a fungus level >1000 CFU/m^3

Date And Time	Study Area: Sampling Location	Relation to Compost Site	Odor Intensity	Fungus CFU/m^3	Bacteria CFU/m^3	Wind Speed mph	Wind Direction Degrees	CO_2 min-max ppm	CO min-max[A] ppm	Comments
6/25/08 10:13	Great Gardens Compost 138 Yaphank Ave.	Neither	Med.-Weak	560	600	<3-4	Var-240°	425-472	<0.1-<0.1	CO and CO_2 slightly higher downwind
6/25/08 14:01	Firematics, Bldg 167 (S. of Maint. Garage)	Downwind	Medium (rancid)	4,000	3,965	<3-6	Var-190°	482-541	<0.1—1.3	
6/25/08 15:14	CAM	Background	None	160	325	4	197°	NA	0.1	
9/6/07 11:14	Great Gardens Compost Firematics, N. of Sump (near bldg. 811)	Downwind	Present	2,750	440	9	171°	412-428	NA	
9/6/07 11:59	138 Yaphank Ave.	Upwind	None	107	190	Calm	Variable	428-454	NA	
9/6/07 15:25	CAM	Background	None	40	157	8	170°	NA	0.1	
1/31/08 11:22	Great Gardens Compost 138 Yaphank Ave.	Downwind	Intermittent	2,250	10	3-8	300-340°	267-313	<0.1-<0.1	
1/31/08 12:32	Firematics Parking Lot (North/of Bldg.676)	Upwind	None	<10	575	<3-5	270-330°	311-369	<0.1-<0.1	
1/31/08 16:00	CAM	Background	None	50	<10	3-4	351-4°	NA	0.1	
5/30/08 12:18	Great Gardens Compost 138 Yaphank Ave.	Neither	None	255	1,425	<3-5	Variable	426-466	<0.1-<0.1	
5/30/08 13:15	Firematics, Bldg 167 (S. of Maint. Garage)	Downwind	Strong	2,000	1,425	<3-7	185°	411-462	<0.1-<0.1	
5/30/08 14:32	CAM	Background	None	<10	250	5	165°	NA	<0.1	

[A] – CO values for CAM represent hourly averages

Appendix 2 (continued)

Data for Carbon Monoxide and Carbon Dioxide from Sampling Events having a fungus level >1000 CFU/m^3

Date And Time	Study Area: Sampling Location	Relation to Compost Site	Odor Intensity	Fungus CFU/m^3	Bacteria CFU/m^3	Wind Speed mph	Wind Direction Degrees	CO_2 min-max ppm	CO min-max[A] ppm	Comments
9/28/07 11:41	Great Gardens Compost 138 Yaphank Ave.	Downwind	Present	2,000	325	4	291°	421-449	<0.1-<0.1	
9/28/0714:57	Firematics, N. of Sump (near bldg. 811)	Upwind	None	323	210	6	314°	423-448	<0.1-<0.1	
9/28/07 15:37	CAM	Background	None	15	20	4	317°	NA	<0.1	
11/8/07 14:00	Great Gardens Compost 138 Yaphank Ave.	Downwind	Medium	1,730	210	<3-5	Var-325°	298-326	<0.1-<0.1	
11/8/07 15:00	Firematics, North of Drainage Sump	Upwind	None	50	<10	3-4	Var(290-40)°	297-307	<0.1-<0.1	
11/8/07 15:50	CAM	Background	None	<10	15	5	Variable	NA	0.1	
10/16/07 13:28	Great Gardens Compost Firematics, N. of Sump (near bldg. 811)	Upwind	None	20	160	Calm	Var-270°	409-431	<0.1-<0.1	
10/16/07 14:06	138 Yaphank Ave.	Downwind	Strong	1,370	1,350	7	270-300°	436-453	<0.1-<0.1	
10/16/07 14:53	CAM	Background	None	185	60	Calm	Variable	NA	<0.1	
9/4/08 12:36	Great Gardens Compost 138 Yaphank Ave.	Neither	None	150	550	Calm	Variable	448-470	<0.1-<0.1	
9/4/08 13:32	Firematics, Bldg 167 (S. of Maint. Garage)	Downwind	Med.-Weak	1,225	660	Calm	Variable	461-503	<0.1-<0.1	
9/4/08 14:26	CAM	Background	None	15	115	4	187°	NA	0.1	

[A] CO values represent hourly averages.

Appendix 2 (continued)

Data for Carbon Monoxide and Carbon Dioxide from Sampling Events having a fungus level >1000 CFU/m^3

Date And Time	Study Area: Sampling Location	Up or Down Wind Relation to Compost Site	Odor Intensity	Fungus CFU/m^3	Bacteria CFU/m^3	Wind Speed mph	Wind Direction Degrees	CO_2 min-max ppm	CO min-max[A] ppm	Comments
1/16/08 10:27	Great Gardens Compost 138 Yaphank Ave.	Downwind	Strong	1,150	<10	5-8	300-340°	282-308	<0.1-<0.1	
1/16/08 11:28	Firematics, N. of Sump (near bldg. 811)	Upwind	None	18	<10	Calm	320-350°	278-303	<0.1-<0.1	
1/16/08 15:45	CAM	Background	None	13	NA	4	304°	NA	<0.1	
7/30/08 10:08	Manorville Yard Waste Composting Facility, (on site)	Downwind	Medium	2,575	335	4-6	140°	409-511	<0.1-<0.1	CO_2 slightly higher downwind Windrows being turned
7/30/08 11:40	18 Charter Court	Neither	None	35	48	Calm	Variable	438-461	<0.1-<0.1	
7/30/08 15:43	CAM	Background	None	20	140	3	165°	NA	<0.1	

[A] CO values represent hourly averages.

Appendix 3

Olfactory Findings from Study Area around Global Land Material, Arthur Ave, Bellport, N.Y.

Date	Time 2400 hrs DST	Staff name	Location	Location GPS	Wind Dir	Wind Speed mph	Odor Description	Comments
08/27/07	11:05	K. Hill	Montauk Hwy., Bellport	N 40º 46.582' W072º 55.849'	NNE ≈0 - 30º		No noticeable compost odor	north of Global Land Materials 286-3322
10/05/07	1430	R. Seyfarth	Beaver Dam Rd		S-SW		No odor	
10/05/07	1435	R. Seyfarth	Arthur Ave		S-SW		No odor	
10/05/07	1440	R. Seyfarth	Montauk Hwy		S-SW		No odor	
11/28/07	845	R. Seyfarth	Beaver Dam & Arthur		N-NW		Slight compost odor	
11/28/07	850	R. Seyfarth	Arthur Av near Globe		N-NW		No odor	
11/28/07	1320	K. Hill	Across from Salvage Auto Auctions Copart, 1983 Montauk Hwy		W-NW	5 - 10	No Compost Odor Noted	
11/28/07	1322	K. Hill	Across from 148 Beaverdam Road		W-NW	5 - 10	Moderate compost odor	
11/28/07	1326	K. Hill	Intersection of Bellview Ave & Beaverdam Road		W-NW	5 - 10	Moderate compost odor	
11/28/07	1343	K. Hill	New Brookhaven Townhouse		W-NW	5 - 10	Asphalt odor	
11/28/07	1350	K. Hill	#5 Belleview		W-NW	5 - 10	Moderate compost odor	

Appendix 3A

Olfactory Findings from Study Area around Village of Bellport Composting Facility, Wards Lane, Bellport, N.Y.

Date	Time 2400 hrs DST	Staff name	Location	Location GPS	Wind Dir	Wind Speed mph	Odor Description	Comments
08/27/07	11:20	"	Front gate of Bellport Town Leaf Compost Facility	N 40º 46.193' W072º 56.246'	≈70 - 75º		No noticeable compost odor	
"	11:28	"	64 Ward Lane, Bellport front of driveway	N 40º 46.241' W072º 56.251'	≈340º		No noticeable compost odor	
"	11:36	"	122 New Jersey Ave., Bellport, front of driveway	N 40º 46.237' W072º 56.369'	≈0º north		No noticeable compost odor	
10/05/07	1420	R. Seyfarth	Wards La, near entrance		S-SW		No odor	
11/27/07	1310	E. Geoghegan	Wards Lane		NE		No odor	Site visits made In response to telephone call from NYSDOH
11/27/07	1320	E. Geoghegan	Wards & Beaver Dam		NE		Wood burning stove odor	regarding a compost odor complaint from Ms. Grucci, 64 Wards Lane,
11/27/07	1330	E. Geoghegan	Head of the Neck Rd		NE		No odor	Bellport
11/27/07	1335	E. Geoghegan	Wards Lane		NE		No odor	
11/28/07	835	R. Seyfarth	Wards Lane		N-NW		No odor	
11/28/07	1330	K. Hill	64 Wards Lane		W-NW	5 - 10	No Compost Odor Noted	
11/28/07	1335	K. Hill	Bellport Town Compost Facility.		W-NW	5 - 10	No Compost Odor Noted	Garbage truck bringing in new leaves. Driver doesn't know if they have removed piles. New leaves to left of gate inside

Appendix 3A (cont'd)

Olfactory Findings from Study Area around Village of Bellport Composting Facility, Wards Lane, Bellport, N.Y.

Date	Time 2400 hrs DST	Staff name	Location	Location GPS	Wind Dir	Wind Speed mph	Odor Description	Comments
01/29/08	13:20	R. Seyfarth	Entrance to site		SW - NW	Varied	Slight odor	
01/29/08	13:30	R. Seyfarth	58 - 64 Wards La (N of site)		SW - NW	Varied	No odor	
01/29/08	13:35	R. Seyfarth	38 Wards La (S of Site)		SW - NW	Varied	No odor	
07/28/08	13:30	W. Skeats	Wards Lane		East	Slight	No Odors	
07/29/08	12:30	W. Skeats	Wards Lane		West		No Odors	

Appendix 4

Olfactory Findings from Study Area around Great Gardens LLC, Horseblock Rd., Yaphank, N.Y.

Date	Time 2400 hrs DST	Staff name	Location	Location GPS	Wind Dir	Wind Speed mph	Odor Description	Comments
8/27/2007	1210	Ken Hill	Behind Bldg C167 FRES	N 40º 48.625' W072º 55.127'	NE - E 65 - 110º		No noticeable compost odor	
8/27/2007	1213	Ken Hill	Outside of gate of STP	N 40º 48.617' W072º 55.437'	NE - E 65 - 110º		No noticeable compost odor	
9/5/2007	1233	K. Hill	FRES, bldg C167	N 40º 48.627' W072º 55.124'	NE		No noticeable compost odor	
9/5/2007	1237	K. Hill	STP, Yaphank	N 40º 48.620' W072º 55.433'	300-350		No noticeable compost odor	
9/11/2007	1400	E. Springer	FRES Bldg		S-SW		Very Strong Compost Odor	≈ 1.3 mph, all morning, cleared after heavy rain @ 1500 hrs.
9/12/2007	820-840	R. Seyfarth	Firematics		W-NW		No odor noted	
9/12/2007	820-840	R. Seyfarth	Southview Court		W-NW		No odor noted	
9/12/2007	820-840	R. Seyfarth	Yaphank Ave. (#172-138)		W-NW		Compost odors noted	
9/12/2007	820-840	R. Seyfarth	Yaphank Av/Horseblock Rd		W-NW		No odor noted	
9/12/2007	820-840	R. Seyfarth	Horseblock Rd E of Landfill		W-NW		Non-compost odors noted	
9/12/2007	1335-1355	R. Seyfarth	Firematic		W (varied)		No odors noted	
9/12/2007	1335-1355	R. Seyfarth	Southview		W (varied)		Compost odor noted	
9/12/2007	1335-1355	R. Seyfarth	172-138 Yaphank Ave		W (varied)		Compost odor noted	

Appendix 4 (cont'd)

Olfactory Findings from Study Area around Great Gardens LLC, Horseblock Rd., Yaphank, N.Y.

Date	Time 2400 hrs DST	Staff name	Location	Location GPS	Wind Dir	Wind Speed mph	Odor Description	Comments
9/12/2007	1335-1355	R. Seyfarth	Horseblock & Yaphank		W (varied)		No odors noted	
9/13/2007	1530	R. Seyfarth	Building C-167		S-SW		Compost odor noted	
9/13/2007	1530	R. Seyfarth	Firemetic STP		S-SW		No odor	
9/13/2007	1530	R. Seyfarth	Southview		S-SW		No odor	
9/20/2007	1230	R. Seyfarth	Firematic Bld C-167		SW		Compost odor noted	
9/20/2007	1230	R. Seyfarth	Firematic STP		SW		Slight sewage odor	
9/20/2007	1230	R. Seyfarth	Firematic Suffolk & East Av		SW		Compost odor noted	
9/20/2007	1230	R. Seyfarth	Southview		SW		No odors noted	
9/20/2007	1230	R. Seyfarth	172-138 Yaphank Av		SW		No odors noted	
9/24/2007	1510	E. Springer	FRES Bldg		SW	4.3 mph	strong odor	
9/25/2007	1335	E. Springer	FRES bldg				strong odor	
9/25/2007	1410	R. Seyfarth	Foley Center		S-SW		No odor	
9/25/2007	1420	R. Seyfarth	FRES C-167 to STP		S-SW		No odor	

Appendix 4 (cont'd)

Olfactory Findings from Study Area around Great Gardens LLC, Horseblock Rd., Yaphank, N.Y.

Date	Time 2400 hrs DST	Staff name	Location	Location GPS	Wind Dii	Wind Speed mph	Odor Description	Comments
9/25/2007	1435	R. Seyfarth	FRES, East side of Bldg		S-SW		Mild compost odor	Spoke to woman who notified Ed Springer of odors, she said odor noted at ~1240
9/25/2007	1445	R. Seyfarth	Near excavations & C-167		S-SW		No odor	
9/25/2007	1450	R. Seyfarth	FRES, East side of Bldg		S-SW		No odor	
9/25/2007	1455	R. Seyfarth	172-138 Yaphank Ave		S-SW		No odor	
9/26/2007	1600	R. Seyfarth	E side of FRES & C-167		S-SW		Mild Compost odors	
9/26/2007	1600	R. Seyfarth	STP		S-SW		No odor	
9/26/2007	1605	R. Seyfarth	138-172 Yaphank Ave		S-SW		No odor	
9/26/2007	1610	R. Seyfarth	Foley Center		S-SW		No odor	
9/27/2007	1000	R. Seyfarth	FRES, E. Side		S-SW		Mild Compost odors noted	Wind Very Slight
9/27/2007	1005	R. Seyfarth	FRES -STP		S-SW		No odor	Wind Very Slight
9/27/2007	1010	R. Seyfarth	Sump - Yaphank Ave		S-SW		Mild Compost odors noted	Wind Very Slight
10/5/2007	840	R. Seyfarth	FRES - STP, C-167		S-SW		No odor	Foggy
10/5/2007	845	R. Seyfarth	FRES - E Side		S-SW		No odor	Foggy
10/5/2007	850	R. Seyfarth	Sump - Yaphank Ave		S-SW		Fairly Strong Compost Odor	Foggy
10/5/2007	855	R. Seyfarth	172-138 Yaphank Ave		S-SW		No Odor	Foggy
10/5/2007	855	R. Seyfarth	Horseblock Rd, Near landfill		S-SW		slight "landfill" odor	Foggy

Appendix 4 (cont'd)

Olfactory Findings from Study Area around Great Gardens LLC, Horseblock Rd., Yaphank, N.Y.

Date	Time 2400 hrs DST	Staff name	Location	Location GPS	Wind Dir	Wind Speed mph	Odor Description	Comments
10/10/2007	830	R. Seyfarth	FRES, C-167, STP		Varied*		No odor	Light Rain *Wind varied from NW-W-SW
10/10/2007	840	R. Seyfarth	STP		Varied		Slight Compost odors	Light Rain *Wind varied from NW-W-SW
10/10/2007	845	R. Seyfarth	FRES, C-167		Varied		No odor	Light Rain *Wind varied from NW-W-SW
10/10/2007	850	R. Seyfarth	172-138 Yaphank Ave		Varied		No odor	Light Rain
11/13/2007	1535	R. Seyfarth	FRES		N-NW		No odor	
11/13/2007	1540	R. Seyfarth	C-167, STP		N-NW		No odor	
11/13/2007	1545	R. Seyfarth	Yaphank Ave		N-NW		No odor	
11/15/2007	840	R. Seyfarth	C-167		S	Strong	Compost odors	
11/15/2007	845	R. Seyfarth	STP		S	Strong	No odors	
11/15/2007	850	R. Seyfarth	FRES		S	Strong	Slight compost odors	
11/15/2007	855	R. Seyfarth	Sump on Yaphank Ave		S	Strong	No odors	
11/15/2007	855	R. Seyfarth	Sump on Yaphank Ave		S	Strong	No odors	

Appendix 4 (cont'd)

Olfactory Findings from Study Area around Great Gardens LLC, Horseblock Rd., Yaphank, N.Y.

Date	Time 2400 hrs DST	Staff name	Location	Location GPS	Wind Dir	Wind Speed mph	Odor Description	Comments
11/28/2007	1256	K. Hill	C-167 (Front)		W-NW	5 -10	No compost odor noted	
"	1258	"	Front of Sump		"	"	"	
"	1300	"	End of Nick Court		"	"	"	
"	1305	"	End of Southview Court		"	"	"	
"	1307	"	Front of 138 Yaphank Ave		"	"	"	
"	1312	"	Front of 444 Horseblock Rd		"	"	"	
12/4/2007	1000	R. Seyfarth	172 Yaphank Av		NW		Compost odor noted	
12/4/2007	1010	R. Seyfarth	FRES, C-167, STP		NW		No odor	
12/5/2007		R. Seyfarth	FRES, C-167		N-NW	Strong	No odor	
12/5/2007		R. Seyfarth	172 - 138 Yaphank Av		N-NW	Strong	No odor	
12/5/2007		R. Seyfarth	Yaphank Av & Horseblock		N-NW	Strong	No odor	
1/25/2008	8:30	R. Seyfarth	C-167, STP		SW	Slight		
1/25/2008	8:45	R. Seyfarth	FRES		SW	Slight	No odor	
1/25/2008	8:55	R. Seyfarth	Sump		SW	Slight	Slight compost odor	
1/25/2008	9:00	R. Seyfarth	172-138 Yaphank Av		SW	Slight	No odor	
1/25/2008	9:05	R. Seyfarth	Horseblock Rd		SW	Slight	Slight odor from landfill	

Appendix 4 (cont'd)

Olfactory Findings from Study Area around Great Gardens LLC, Horseblock Rd., Yaphank, N.Y.

Date	Time 2400 hrs DST	Staff name	Location	Location GPS	Wind Dir	Wind Speed mph	Odor Description	Comments
2/21/2008	1603	K. Hill	FRES n/s Sump	N 40° 48.639' W072 ° 55.261'	320	0 - 5	No compost odor noted	
6/10/2008	8:25	R. Seyfarth	STP			~ 0	No odors	Hot & Humid
6/10/2008	8:40	R. Seyfarth	FRES			~ 0	Very slight odor	Hot & Humid
6/10/2008	8:45	R. Seyfarth	Sump			~ 0	Intermittent odor	Hot & Humid
6/10/2008	8:50	R. Seyfarth	138 - 172 Yaphank Ave			~ 0	Compost odors	Hot & Humid
6/10/2008	8:55	R. Seyfarth	Horseblock & Yaphank			~ 0	No odors	Hot & Humid
7/10/2008	8:30	R. Seyfarth	FRES		N	Light	No odors	
7/10/2008	8:35	R. Seyfarth	C-167		N	Light	No odors	
7/10/2008	8:45	R. Seyfarth	138 - 172 Yaphank Ave		N	Light	No odors	
7/10/2008	8:50	R. Seyfarth	Horseblock & Yaphank		N	Light	Slight odors	
8/20/2008	8:30	R. Seyfarth	FRES		N-NW	Moderate	No odors	
8/20/2008	8:35	R. Seyfarth	138-172 Yaphank Av		N-NW	Moderate	No odors	
8/20/2008	8:40	R. Seyfarth	Horseblock & Yaphank Av		N-NW	Moderate	No odors	
8/20/2008	8:45	R. Seyfarth	Great Gardens Entrance		N-NW	Moderate	Compost odors	

Appendix 4 (cont'd)

Olfactory Findings from Study Area around Great Gardens LLC, Horseblock Rd., Yaphank, N.Y.

Date	Time 2400 hrs DST	Staff name	Location	Location GPS	Wind Dir	Wind Speed mph	Odor Description	Comments
8/26/2008	9:35	R. Seyfarth	Sump		N-NW	Moderate	No odors	
8/26/2008	9:40	R. Seyfarth	138 - 172 Yaphank Av		N-NW	Moderate	No odors	
8/26/2008	9:45	R. Seyfarth	Horseblock & Yaphank		N-NW	Moderate	No odors	
8/26/2008	9:50	R. Seyfarth	Great Gardens Entrance		N-NW	Moderate	Compost odors	
9/18/2008	8:40	R. Seyfarth	STP		N-NW	Light	No odors	
9/18/2008	8:45	R. Seyfarth	C-167 to FRES		N-NW	Light	No odors	
9/18/2008	8:50	R. Seyfarth	172 Yaphank Av		N-NW	Light	No odors	
9/18/2008	8:55	R. Seyfarth	138 Yaphank to Horseblock		N-NW	Light	Compost odors	
10/1/2008	8:35	R. Seyfarth	Yaphank Av & Nick Ct.		S-SW	Moderate	Compost odor	
10/1/2008	8:40	R. Seyfarth	FRES		S-SW	Moderate	Slight odor	
10/1/2008	8:45	R. Seyfarth	C-167 to STP		S-SW	Moderate	No odor	
10/1/2008	8:50	R. Seyfarth	Yap. Av & Southview Ct		S-SW	Moderate	Compost Odor	
10/1/2008	8:50	R. Seyfarth	138 Yaphank Av		S-SW	Moderate	No Odor	

Appendix 4 (cont'd)

Olfactory Findings from Study Area around Great Gardens LLC, Horseblock Rd., Yaphank, N.Y.

Date	Time 2400 hrs DST	Staff name	Location	Location GPS	Wind Dir	Wind Speed mph	Odor Description	Comments
10/10/2008	8:40	R. Seyfarth	FRES		W	Very Light	No Odor	
10/10/2008	8:45	R. Seyfarth	C-167 to STP		W	Very Light	No Odor	
10/10/2008	8:50	R. Seyfarth	Sump		W	Very Light	No Odor	
10/10/2008	8:55	R. Seyfarth	172 Yaphank Av		W	Very Light	Slight Odor	
10/10/2008	8:57	R. Seyfarth	138 Yaphank Av		W	Very Light	Strong Odor	
10/10/2008	9:00	R. Seyfarth	Yaphank & Horseblock		W	Very Light	No Odor	
1/8/2009	12:34	K. Hill	Front of 138 Yaphank Ave		W	10 - 20	Strong	
1/8/2009	12:36	K. Hill	Front of 172 Yaphank Ave		W	10 - 20	Strong	
1/8/2009	12:37	K. Hill	Front of Field w/o #172		W	10 - 20	Strong	
1/8/2009	12:39	K. Hill	Front of 10 Southview Court		W	10 - 20	Moderate	
1/8/2009	12:41	K. Hill	Sump s/s Yaphank Av n/o 172 Yaphank Ave		W	10 - 20	Strong	Spoke to Guy Wheaton, P.E., NYSDEC who was also at sump site

Appendix 5 - Olfactory Findings from Study Area around Long Island Compost Company (Farm Fields), LIE/Exit 69, Manorville, NY

Date	Time 2400 hrs DST	Staff name	Location	Location GPS	Wind Dir	Wind Speed mph	Odor Description	Comments
8/27/07	1235	K. Hill	Exit 69, half way down east bound exit ramp	N 40º 51.714' W072º 49.475'	SSE ≈120-130º		No noticeable compost odor	
"	1248	"	South Street Elem. Schl east part of parking lot	N 40º 51.299' W072º 48.844'	NNW -N ≈335 - 360 º		No noticeable compost odor	
"	1256	"	NE corner of North St South St. intersection	N 40º 51.214' W072º 50.548'	ESE ≈140º		Slight compost odor	4 windrows
"	1326	"	Exit 69, west bound entrance ramp	N 40º 51.780' W072º 49.520'	ENE - E ≈75 - 95º		No noticeable compost odor	
9/5/07	1258	K. Hill	Exit 69, half way down east bound exit ramp	N 40º 51.712' W072º 49.460'	no wind	no wind	No noticeable compost odor	
"	1303	"	South Street Elem. Schl east part of parking lot	N 40º 51.308' W072º 48.820'	350-15º	wind < 5 mph	No noticeable compost odor	No noticeable compost odor
"	1311	"	NE corner of North St South St. intersection	N 40º 51.193' W072º 50.522'	15-105º	0 - 5 Intermittent	No noticeable compost odor	4 windrows-no activity
"	1323	"	Exit 69, west bound entrance ramp	N 40º 51.780' W072º 49.521'	110º	≈ 0-10 mph	No noticeable compost odor	4 windrows-no activity weeds growing at base of piles

Appendix 5 - Olfactory Findings from Study Area around Long Island Compost Company (Farm Fields), LIE/Exit 69, Manorville, NY

Date	Time 2400 hrs DST	Staff name	Location	Location GPS	Wind Dir	Wind Speed mph	Odor Description	Comments
9/12/07	1350	K. Hill	Exit 69, half way down east bound exit ramp	N 40º 51.714' W072º 49.463'	250º	10 - 15	No noticeable compost odor	
"	1356	"	South Street Elem. Schl east part of parking lot	N 40º 51.312' W072º 48.824'	265º	"	No noticeable compost odor	
"	1403	"	just east of corner of North St South St. intersection (downwind of windrows)	N 40º 51.214' W072º 50.549'	260º	"	compost odor noted	windrows recently turned as there are no weeds on piles
"	1406		just north of corner of North St South St. intersection (upwind of windrows)	N 40º 51.214' W072º 50.548'	260º	"	No noticeable compost odor	
"	1417	"	Exit 69, west bound entrance ramp	N 40º 51.792' W072º 49.510'	275º	5 -10	No noticeable compost odor	weeds growing on windrows
10/2/07	1300	R. Seyfarth	Wading River Rd, S/O LIE		S	Slight	No odor	
10/2/07	1310	R. Seyfarth	South St		S	Slight	No odor	
10/2/07	1315	R. Seyfarth	186 North St		S	Slight	Horse manure odor	
10/26/07	1340	R. Seyfarth	Wading River Rd & LIE		E		No odor	
10/26/07	1345	R. Seyfarth	North St & LIE		E		No odor	Only 1 compost pile at NE corner of South St & North St
10/26/07	1400	R. Seyfarth	LIE (North side)		E		No odor	No piles on NW corner of LIE & Wading River Rd

Appendix 5 - Olfactory Findings from Study Area around Long Island Compost Company (Farm Fields), LIE/Exit 69, Manorville, NY

Date	Time 2400 hrs DST	Staff name	Location	Location GPS	Wind Dir	Wind Speed mph	Odor Description	Comments
12/4/07	835	R. Seyfarth	LIE (No. side) & Wading River RD		NW		No odor	
12/4/07	845	R. Seyfarth	South St & North St		NW		No odor	
12/4/07	850	R. Seyfarth	LIE North Entrance		NW		No odor	New compost piles being established @ NE corner of LIE & W.R. Rd
12/11/07	1650	R. Seyfarth	LIE (No. side) & W.R.Rd		E	Slight	Strong Compost Odor	
01/18/08	1015	S Manuel	Exit 69 west bound exit ramp at Wading River Rd	N 40° 51.900' W072°49.393'	230°	0-5mph	no noticeable compost odor	Rain event in A.M. Sunny at time of site visit
01/21/08	0750	S Manuel	Exit 69 west bound exit ramp at Wading River Rd	N 40° 51.900' W072°49.395'	Variable	0-5 mph	no noticeable compost odor	compost piles had frost coating
01/29/08	0721	S Manuel	Exit 69 west bound exit ramp at Wading River Rd	N 40° 51.900' W072°49.391'	no wind	0	compost odor noted	
2/21/08	1349	K. Hill	LIE Exit 69 east bound	N 40 º 51.714' W072 º 49.454	290 - 300	10 - 15	moderate to strong compost odor	
2/21/08	1356	K. Hill	South Street School prkng lot	N40 o 51.303' W072 o 48.821'	290 - 300	5 - 10	no compost odor	
2/21/08	1405	K. Hill	n/e corner of Weeks Rd & South St.	N40 o 51.190 W072 o 50.496	280 - 300	5 - 10	slight compost odor	
2/21/08	1415	K. Hill	LIE Exit 69 west bound	N40 o 51.830' W072 o 49.475'	330 - 340	5 - 10	moderate to strong compost odor	≈ 20 -30' high pile on north of Dosiak property, 4 compost windrows near LIE entrance

Appendix 5 - Olfactory Findings from Study Area around Long Island Compost Company (Farm Fields), LIE/Exit 69, Manorville, NY

Date	Time 2400 hrs DST	Staff name	Location	Location GPS	Wind Dir	Wind Speed mph	Odor Description	Comments
6/19/08	8:45	R. Seyfarth	North & South of Exit 69			Almost None	Compost Odors	Compost piles N/E Corner of Exit 69 being turned
6/19/08	8:50	R. Seyfarth	School			Almost None	No Odors	
6/19/08	8:55	R. Seyfarth	South St & Woodland			Almost None	Slight Odor	
6/19/08	9:00	R. Seyfarth	Corner North St & South St			Almost None	No Odors	
6/19/08	9:05	R. Seyfarth	Compost Piles N/W of Exit 69			Almost None	No Odors	
8/26/08	8:40	R. Seyfarth	Exit 69	W		Light	No Odors	
8/26/08	8:50	R. Seyfarth	North & South Sts	W		Light	No Odors	
8/26/08	9:05	R. Seyfarth	Exit 69	W		Light	No Odors	Compost piles N/E Corner of Exit 69 being turned
8/26/08	9:10	R. Seyfarth	School	W		Light	No Odors	
9/26/08	2:00	R. Seyfarth	Exit 69			Very Light	No Odors	Light rain
9/26/08	2:20	R. Seyfarth	Exit 69			Very Light	No Odors	Light rain

Appendix 5A - Olfactory Findings from Study Area around Manorville Yard Waste Composting Facility, Papermill Road, Manorville, N.Y.

Date	Time 2400 hrs DST	Staff name	Location	Location GPS	Wind Dir	Wind Speed mph	Odor Description	Comments
9/12/07	1446	K Hill	Papermill Compost Site just pass guard house	N 40º 50.061' W072º 46.907'	260º	5 - 10	No noticeable compost odor	
"	1511	"	18 Manorage Road, Manorville	N 40º 50.705' W072º 45.036'	270º	0 - 5	"	
"	1512	"	20 Manorage Road, Manorville	N 40º 50.728' W072º 45.038'	250º	0 - 5	"	Spoke to Kurt Clacher he said source of odor may be from farmer (Ringhoff) just off Rt.51
"	1538	"	38 Windcrest Drive, Manorville	N 40º 50.247' W072º 46.374'	220º	0 - 5	"	
"	1540	"	31 Windcrest Drive, Manorville	N 40º 50.189' W072º 46.397'	250º	5 - 10	"	
"	1543	"	5 Windcrest Drive, Manorville	N 40º 50.388' W072º 46.484'	295º	5 - 10	"	
12/10/07	1630	R. Seyfarth	Papermill Compost Enterance		None		No odor	Trucks dumping fresh compost. Steam rising straight up
12/10/07	1640	R. Seyfarth	Charter Ct.		None		No odor	

Appendix 5A - Olfactory Findings from Study Area around Manorville Yard Waste Composting Facility, Papermill Road, Manorville, N.Y.

Date	Time 2400 hrs DST	Staff name	Location	Location GPS	Wind Dir	Wind Speed mph	Odor Description	Comments
12/20/07	1255	K Hill	End of Deerfield , Manorville		N	5 -10	No odor	
12/20/07	1257	K Hill	26 Windcrest, Manorville		N	5 -10	No odor	
12/20/07	1259	K Hill	End of Caro Court, Manorville		N	5 -10	No odor	
12/20/07	1301	K Hill	Intersect Windcrest/Clancy		N	5 -10	No odor	
12/20/07	1305	K Hill	Front of 4 Christine La, Manorville		N	5 -10	No odor	
12/20/07	1313	K Hill	Front 24 Charter Ct., Manorville		N	5 -10	No odor	
12/20/07	1315	K Hill	Front 3 Charter Ct., Manorville		N	5 -10	No odor	
12/20/07	1320-39	K Hill	Brookhaven Compost Fac. (Marty)		N	5 -10		
1/2/08	14:20	R. Seyfarth	Entrance to Compost Site		N	Light	No odor	Large piles of bagged leaves(?)
1/2/08	14:30	R. Seyfarth	Jamaica, E. of Gloria to bend		N	Light	Compost odor	
1/2/08	14:35	R. Seyfarth	Jamaica, E. of bend		N	Light	No odor	
1/2/08	14:40	R. Seyfarth	Jamaica, W. of Gloria		N	Light	No odor	

Appendix 6

Outdoor Biological Air Monitoring at Suffolk County N.Y. Yard Waste Managing Facilities

Bioaerosol sampling was conducted at outdoor up-wind and outdoor down-wind locations, in areas nearby the selected study areas, as well as a background location. Bioaerosol grab samples were collected in order to quantitate viable *Aspergillus fumigatus* (AF) and viable Thermophillic Actinomycetes (TA). A Biotest Hycon RCS High Flow air sampler (Biotest Diagnostic Corporation, Denville, New Jersey), which operates on an impaction principal, was used for this purpose. The RCS sampler uses a rapidly spinning rotor to impact large volumes of air (100Liters/minute) onto an agar strip. The resultant impaction separates the microbes contained in the air onto the agar strip, by centrifugal force.

Viable spores that impinge on the agar growth media will germinate and grow into viable colonies, if culture conditions, including temperature, oxygen concentration, and available nutrients are appropriate. The presence of a colony on the growth medium indicates the deposition of at least one spore onto the agar strip from the sampled air. However, since a single colony may result more than one spore, the viable counts are reported as Colony Forming Units (CFU) per cubic meter (m^3) of air. Selective culture media and growth conditions were used to favor the growth of AF and TA, as these organisms have been found to be associated with composting operations in the past and are potentially pathogenic.

RCS High Flow Bioaerosol Sampler with Rose Bengal Agar sampling strip, remote control, and sterile gloves.

The detection limit for the RCS High Flow sampler is dependent on the volume of air collected. The collection of a large volume of air (longer sampling times) was used at up-wind sites and the background location, to provide optimum sensitivity. However, at down-wind sites the collection of a low volume of air was needed, to avoid the overgrowth of colonies upon the agar strip.

Bioaerosol samples were collected employing varying volume replicates collected up-wind and down-wind. For example, at a typical up-wind site samples of 50 and 200 Liters, would be collected, whereas at a down-wind site 10 and 100 Liter samples would be collected. Once replicates were analyzed, either an average value or in certain cases the best single value would be reported. Reporting the best single results occur under the following conditions; overgrowth on a single strip, making it difficult to count, due to too many colonies present causing an overlap of colonies, or undergrowth on the agar strip, for example results indicating no colonies grown, therefore not enough volume of air was sampled, resulting in inadequate sensitivity.

Rose Bengal (Yeast and Mold) agar medium was used for the collection of AF, and Trypticase Soy agar medium was used for the collecting of TA air samples. All agar medium strips were stored and transported in the dark using a cooler containing ice packs, and were only exposed to light during the short period of time while each air sample was being collected (usually less than 5 minutes). Rose Bengal medium inhibits bacterial growth and also inhibits overgrowth of the medium by some fast growing fungi, particularly Mucor spp. To further select for AF, exposed Rose Bengal agar strips were incubated at 45° C for 72 to 120 hours. Fungal species, which are not thermo-tolerant (as is AF), will not grow readily at this temperature. All fungal colonies, which grew under these conditions and showed typical AF colony morphology, were assumed to be AF. Over

90% of all colonies seen growing under these conditions were identified as putative AF, and nearly all putative AF isolates, which were sub cultured for microscopic confirmation, were in fact AF.

Samples collected for TA on Trypticase Soy agar, were incubated at 52° C for 48 to 72 hours. No attempt was made to identify isolates as to species; therefore these counts are simply reported as total TA.

Appendix 7. Photographs from Various Study Sites

Figure 8. View of Village of Bellport Leaf Compost taken from top of entrance gate. Note: very few leaf piles present

Figure 9. View from entrance to Great Gardens facility. Note: large piles of finished compost and sand

Figure 10. View of Great Gardens facility from FRES building. Note: substantial amount of airborne dust and large piles of finished compost

Figure 11. View of compost windrow turning machine on farm field near LIE Exit 69. Note: large water vapor plume.

Appendix 7 (cont.)

Figure 12. Closer view of compost turning machine on farm field near LIE Exit 69.

Figure 13. View of compost windrow turning machine.

Figure 14. View of PEHL staff collecting bioaerosol sample at Manorville compost facility on Papermill Road.

Figure 15. Southern view of Global Land Materials from the LIRR tracks. Note: Grinding machine and crane to process yard waste.

APPENDIX 8

DRAFT
AIR QUALITY MONITORING WORKPLAN FOR YAPHANK, MANORVILLE, MORICHES AND BELLPORT AREAS

SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES

Steve Levy, Suffolk County Executive
David G. Graham, M.D., M.P.H., Acting Commissioner

Division of Environmental Quality
Vito Minei, P.E., Director
Walter Dawydiak, P.E., J.D., Chief Engineer

Office of Pollution Control
James Meyers, Chief

Public & Environmental Health Laboratory
Kenneth Hill, Chief - PEHL

February 2007

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Overview

In accordance with Resolutions 1129-2006 and 1472-2006, the Suffolk County Department of Health Services (SCDHS) will conduct an air quality monitoring program to assess the air quality in areas near composting facilities in the Yaphank, Manorville, Moriches and Bellport Village areas. Due to time restrictions stated in the Resolutions and resource limitations within SCDHS, each site may only be tested three times.

At each sampling event, air samples will be collected upwind and downwind of the composting facility, a selected site in the impacted residential area and a "background" sample from a non-impacted area. Sampling events will be limited to one site per week due to available personnel restraints. Air samples will be analyzed for volatiles organic compounds (VOCs), *Aspergillus fumigatus* and thermophilic actinomycetes, hydrogen sulfide and respirable particulates. Staff collecting samples will document detectable odors, wind direction and speed.

Organizational Information:

The SCDHS, Division of Environmental Quality conducts comprehensive programs that protect and preserve the natural resources of the county in addition to protecting county residents against adverse environmental factors. Within the Division, the Office of Pollution Control has responsibility for enforcing regulations concerning toxic materials and hazardous materials storage, inspection of commercial and industrial facilities and new and existing public swimming pool reviews and inspections.

The major responsibility of the Public & Environmental Health Laboratory (PEHL) is to perform tests on air, water, soil, hazardous wastes and sewage to determine the existence of any contamination by toxic heavy metals, volatile organic chemicals, pesticides or bacteriological contamination. This responsibility includes testing of both public and private wells and water supplies for potability, monitoring pool and bathing beach water to assure their safety, ocean, bays, lakes, rivers and streams for pollutants and nutrients that can damage the fauna, flora, and appearance of them. The PEHL analyzes samples of ambient air and the air from soil located above petroleum or industrial spills for toxic, organic and inorganic substances. The PEHL also analyzes samples for hazardous materials that may have been discharged, stored or transported in violation of the law. These tests may be part of undercover investigations or raids carried out in co-operation with the District Attorney.

Monitoring Plan:

The primary purpose for monitoring air at several locations during each sampling event is to determine what, if any, contaminants measured in the air can be attributed to the composting facility. This objective is accomplished by collecting a series of samples at specified sites upwind, downwind and at a background location, away from the composting operation.

In addition, samples collected from a pre-selected location within a residential community that can be expected to be impacted, at least under certain atmospheric conditions, by the composting facility will provide information as to the frequency and extent of the impact.

It is important to emphasize that the monitoring program is limited, and deals with an exceptionally complex set of environmental and health variables. As such, it will not necessarily result in a dispositive database. Work done in 1992 at the Islip Composting Facility dealt with a larger centralized source, more intensive monitoring, and an integrated analysis of potential health impacts of a greater population at risk. The Islip effort was unable to establish, or disprove, health impacts, based on limitations in the database, the absence of clear ambient standards, and various confounding factors *(State of New York, Department of Health, 1994 - A Prospective Study of Health Symptoms and Bioaerosol Levels Near a Yard Waste Composting Facility)*. However, all information collected by SCDHS will be shared with NYSDOH and NYSDEC for review, analysis, and determination of potentially appropriate follow-up actions.

Monitoring Frequency:

As stated above, time restrictions contained in the Resolutions and the availability of sampling personnel and equipment will limit the number of sampling events at each site. It is anticipated that a minimum of three sampling events will take place for each location.

Sampling Locations:

Three composting facilities have been chosen for evaluation. The Long Island Compost facility located in Yaphank (subject of Resolution # 1129-2006), the composting operation located near exit 69 of the Long Island Expressway in Manorville, and the Bellport Village Composing operation on Wards Lane in Bellport (subject of Resolution 1472-2006) will be evaluated. See Appendix A

The Moriches area was not included due to the fact that the large composting operation that was previously located near the intersection of Weeks Avenue and Moriches-Middle Island Road, and was the object of several complaints, is not presently in operation. If this site is brought back into use, additional sampling will be scheduled for the surrounding area, time permitting.

Ambient air sample collection and analysis*:*

1. ***Volatile Organic Compounds (VOCs)*** – Air samples will be collected and analyzed for approximately 94 odorous VOCs that are listed as Hazardous Air Pollutants (HAPs) by the USEPA under the Clean Air Act. Samples will be collected via Summa canister or multi-layered Sorbent tubes. Subsequently, the HAPs are determined via the use of a gas chromatograph/mass spectrometer (GC/MS) as per EPA Method TO-14A or TO-17.

2. ***Viable bioaerosols*** – Air samples will be collected and analyzed for both Aspergillus fumigatus (mold) and thermophilic actinomycetes (bacteria). Samples will be collected via the use of a Biotest RCS Hi-flow sampler which captures the organisms. The media strips used in the sampler are then incubated and enumeration of the organisms is recorded. Identification of other bacteria (pathogens) and mold will be attempted.

3. ***Hydrogen sulfide*** - Air samples will be collected and analyzed for odorous hydrogen sulfide. Samples will be collected using Tedlar bags or Summa canisters. Collected

samples will be analyzed via the use of a Monitor Labs Model 9850 SO2 EPA Equivalent Analyzer with a Ecotech H_2S converter. There is a NYSDEC ambient air standard of 10 ppb(v) for hydrogen sulfide. If the grab samples collected for this analysis are found to exceed this standard, additional monitoring may be required to assess the hourly average concentrations.

4. ***Respirable Particulate Matter (PM 2.5)*** – The ambient air will be analyzed, onsite, for respirable particulates ($\leq$ 2.5 microns) via the use of a Thermo Model # pDR-.1200 personal DataRAM portable particulate monitor. The detectable range is 1 - 400,000 $\mu g/M^3$. There are Federal ambient standards for PM 2.5 particulates. The standards are a maximum 15 $\mu g/M^3$ yearly average and 65 ug/M^3 daily average. If the onsite measurements are found to the exceed these standards, consideration will be given for continuous PM 2.5 monitoring

Prior to, and during, the collection of samples SCDHS staff will:
- determine the speed and direction of the wind
- document the presence of any discernable odors.

Quality Assurance /Quality Control (QA/QC):

QA/QC will be incorporated into all respective tasks regarding sample collection, preservation, holding times and sample analysis. QA/QC steps will include the assessment of field blanks, trip blanks, GC/MS tuning, spiked Sorbent traps, etc. as required by the NYSDOH-ELAP/NELAP certification programs.

Training:

As required, staff from the Air Pollution Section of the PEHL will train available Public Health Sanitarians or PEHL staff from other Laboratory Sections, as to appropriate techniques for the collection of samples.

Report Preparation:

A draft report of the findings of the "Air Quality Monitoring of Suffolk County Compost Sites" will be prepared by staff from the SCDHS. Upon completion of peer review by NYS/DOH a commentary period will be allowed for interested parties. After the conclusion of the commentary period, comments will be addressed, and the final report will be issued.

Reference:

Barreau, T., Underwood, M.C. 2005 Personal Communication, California Department of Health Services, Environmental Health Investigations Branch, Oakland, California.

Epstein, E., Epstein, J.I., 1989. Public Health Issues and Composting, BioCycle.

McNeel, S., Kreutzer, R. 1999. Bioaerosols and Green-Waste Composting in California.

California Department of Health Services, Environmental Health Investigations Branch, Oakland, California.

Prasad, M., van der Werf, P.,Brinkmann, A. 2004 Bioaerosols and Composting, A Literature Evaluation. cré. Composting Association of Ireland TEO.

Recer, G.M., Browne, M.L., Horn, E.G., Hill, K.M., Boehler, W.F. 2001. Ambient air levels of *Aspergillus fumigatus* and thermophilic actinomycetes in a residential neighborhood near a yard-waste composting facility. Aerobiologia. 17:99-108.

State of New York, Department of Health, 1994. A Prospective Study of Health Symptoms and Bioaerosol Levels near a Yard Waste Composting Facility. Islip Composting Facility, Town of Islip, Suffolk County, New York. 33350299

Appendix A

Figure 1

Long Island Compost (Great Gardens), Yaphank

Figure 2

Bellport Village Composting Facility, Bellport

Figure 3

Various Compost Piles, Manorville

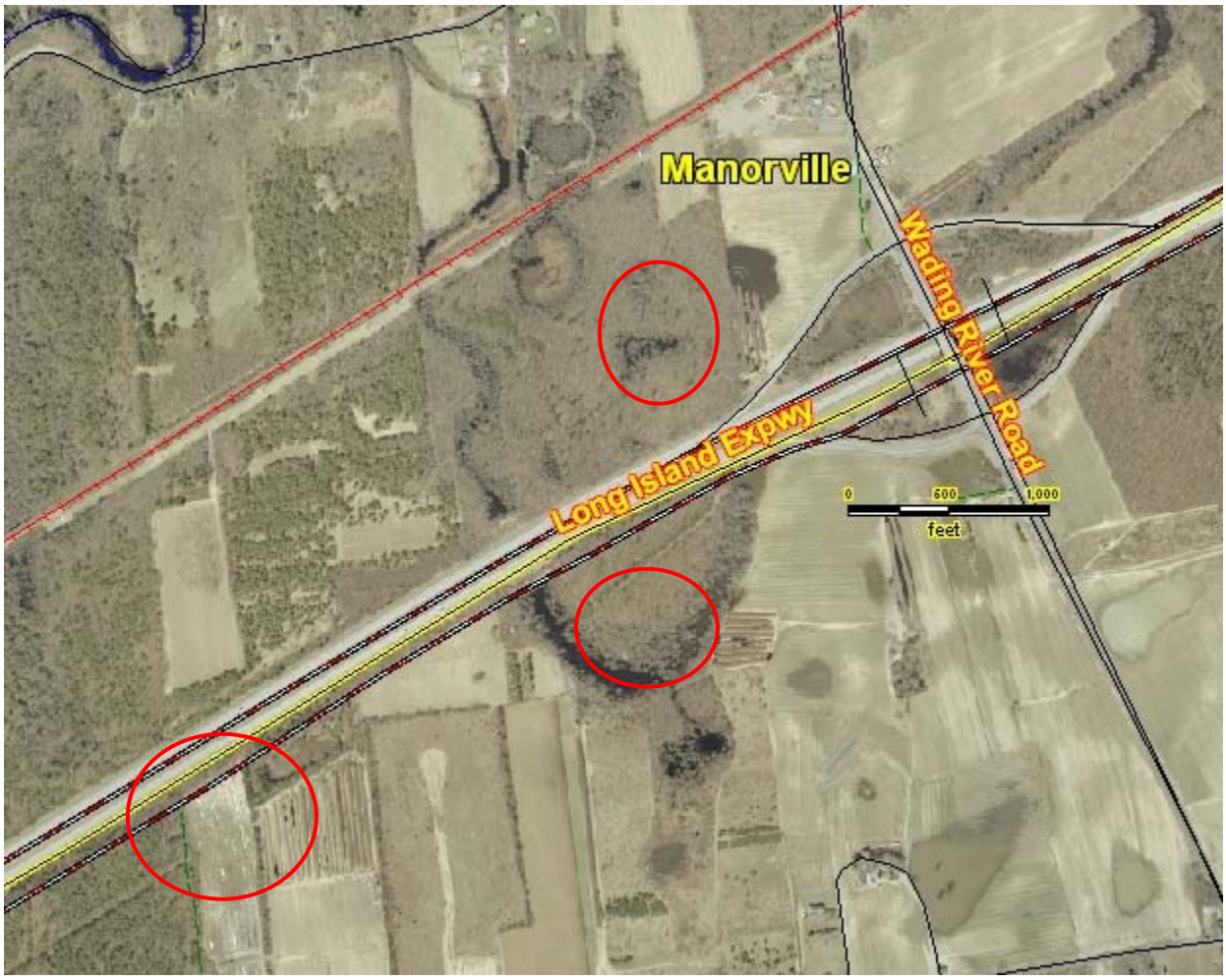
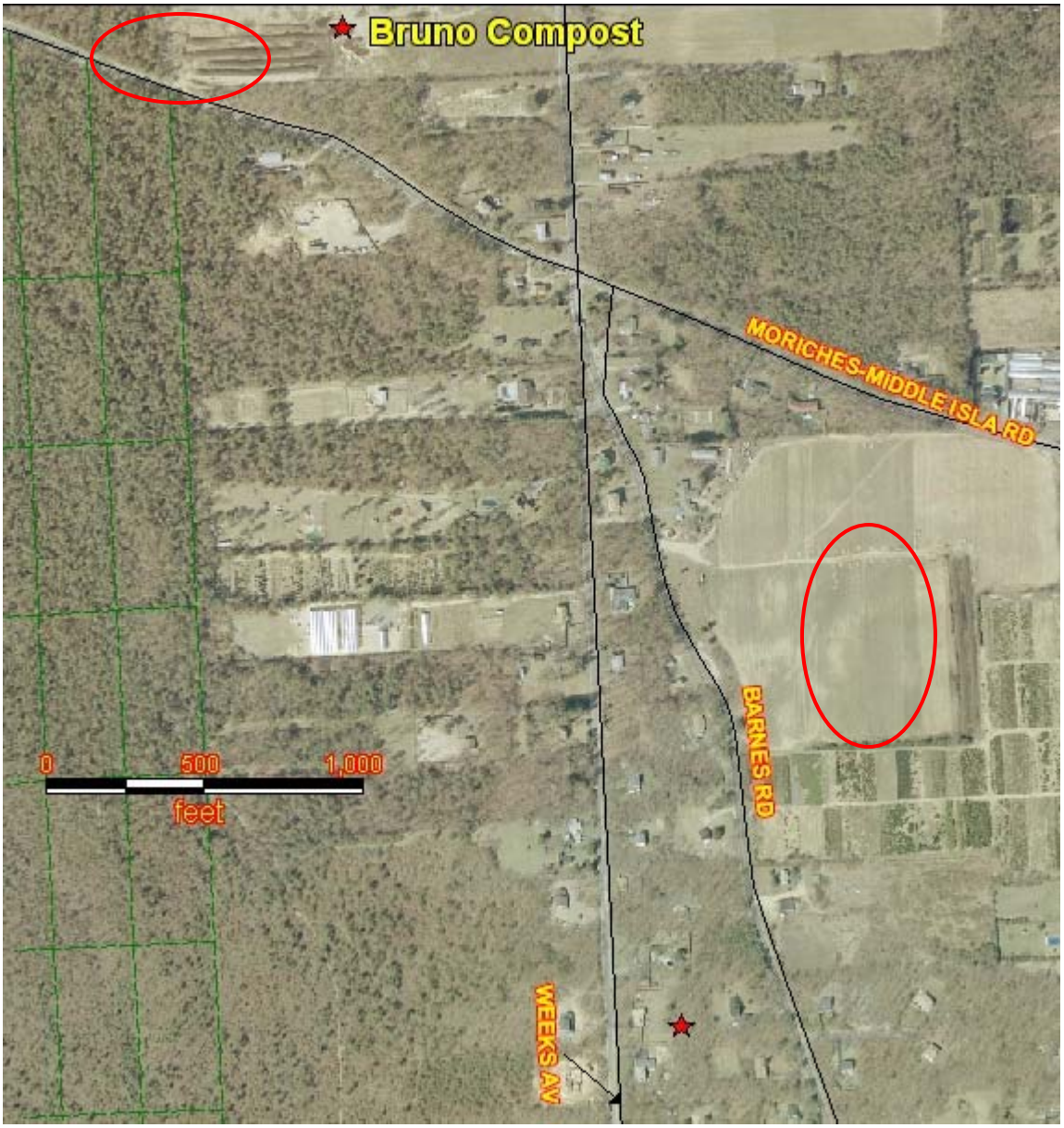


Figure 4

Moriches/Manorville Compost Areas



Appendix 9

Intro. Res. No. 2168-2006 Laid on Table 9/19/2006
Introduced by Legislator Browning

RESOLUTION NO. 1129 –2006, DIRECTING THE SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES TO CONDUCT AN AIR QUALITY TEST IN THE AREA OF YAPHANK, MANORVILLE AND MORICHES

WHEREAS, compost is the end product of a complex feeding pattern involving hundreds of different organisms, in bacteria, fungi, worms, and insects; and

WHEREAS, residents in the area located near the Long Island Compost Corp. Facility in Yaphank, and other composting sites around Manorville and Moriches have complained of odors and particles that have raised concerns regarding the environmental and health impacts of composting operations; and

WHEREAS, Suffolk County supports the concept of compost sites and their environmental goals but believes they should be sited so the health and quality of life of its citizens is guaranteed; and

WHEREAS, an environmental rating of the air quality of the area surrounding the compost facility in Yaphank would help residents determine whether the health and respiratory issues they are experiencing are related to the operation of the compost facility; now, therefore be it

1st **RESOLVED**, that the Commissioner of the Suffolk County Department of Health Services is hereby authorized, empowered, and directed to conduct an investigation or study of the air quality surrounding the Long Island Compost Corp Facility in Yaphank, and the surrounding areas of Manorville and Moriches, and to issue an environmental rating of the air quality; and be it further

2nd **RESOLVED**, that this investigation or study shall be completed within 180 days of the effective date of this Resolution; and be it further

3rd **RESOLVED**, that a written report of the findings and determinations of this investigation or study shall be made available to the County Executive and each member of the Suffolk County Legislature, with recommendations and/or action to be taken to control or reduce the amount or kind of air contaminant harming the residents of this area; and be it further

4th **RESOLVED**, that this Legislature, being the State Environmental Quality Review Act (SEQRA) lead agency, hereby finds and determines that this resolution constitutes a Type II action pursuant to Section 617.5(c)(20), (21) and (27) of Title 6 of the NEW YORK CODE OF RULES AND REGULATIONS (6 NYCRR) and within the meaning of Section 8-0109(2) of the NEW YORK ENVIRONMENTAL CONSERVATION LAW as a promulgation of regulations, rules, policies, procedures, and legislative decisions in connection with continuing agency administration, management and information collection, and the Suffolk County Council on Environmental Quality (CEQ) is hereby directed to circulate any appropriate SEQRA notices of determination of non-applicability or non-significance in accordance with this resolution.

DATED: October 17, 2006

EFFECTIVE PURSUANT TO SECTION 2-15(F) OF THE SUFFOLK COUNTY CHARTER, RETURNED BY THE COUNTY EXECUTIVE UNSIGNED NOVEMBER 2, 2006

Appendix 10

Intro. Res. No. 2516-2006 Laid on Table12/5/2006
Introduced by Legislators Browning and Romaine

RESOLUTION NO. 1472 -2006, DIRECTING THE SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES TO CONDUCT AN AIR QUALITY TEST IN THE AREA OF WARDS LANE, BELLPORT

WHEREAS, compost is the end product of a complex feeding pattern involving hundreds of different organisms, in bacteria, fungi, worms, and insects; and

WHEREAS, residents in the area located near Wards Lane in Bellport, adjacent to a compost facility, have complained of odors and particles that have raised concerns regarding the environmental and health impacts of composting operations; and

WHEREAS, Suffolk County supports the concept of compost sites and their environmental goals but believes they should be sited so the health and quality of life of its citizens is guaranteed; and

WHEREAS, an environmental rating of the air quality of the area surrounding Wards Lane in Bellport would help residents determine whether the health and respiratory issues they are experiencing are related to the operation of the compost facility; now, therefore be it

1st **RESOLVED**, that the Commissioner of the Suffolk County Department of Health Services is hereby authorized, empowered, and directed to conduct an investigation or study of the air quality surrounding Wards Lane in Bellport, and to issue an environmental rating of the air quality; and be it further

2nd **RESOLVED**, that this investigation or study shall be completed within 180 days of the effective date of this Resolution; and be it further

3rd **RESOLVED**, that a written report of the findings and determinations of this investigation or study shall be made available to the County Executive and each member of the Suffolk County Legislature, with recommendations and/or action to be taken to control or reduce the amount or kind of air contaminant harming the residents of this area; and be it further

4th **RESOLVED**, that this Legislature, being the State Environmental Quality Review Act (SEQRA) lead agency, hereby finds and determines that this resolution constitutes a Type II action pursuant to Section 617.5(c)(20), (21) and (27) of Title 6 of the NEW YORK CODE OF RULES AND REGULATIONS (6 NYCRR) and within the meaning of Section 8-0109(2) of the NEW YORK ENVIRONMENTAL CONSERVATION LAW as a promulgation of regulations, rules, policies, procedures, and legislative decisions in connection with continuing agency administration, management and information collection, and the Suffolk County Council on Environmental Quality (CEQ) is hereby directed to circulate any appropriate SEQRA notices of determination of non-applicability or non-significance in accordance with this resolution.

DATED: December 19, 2006

APPROVED BY:

/s/ Steve Levy
County Executive of Suffolk County

Date: December 29, 2006

Appendix 11

STATE OF NEW YORK:
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

In the Matter of the Violations of Articles 19 and 71 of the New York State Environmental Conservation Law (hereinafter "ECL") and Part 211 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (hereinafter "NYCRR"), by GREAT GARDENS, LLC -and- LONG ISLAND COMPOST CORP. (Suffolk and Nassau County) Respondents.	**ORDER ON CONSENT** **File No. R1-20070316-103**

WHEREAS:

1. The Department of Environmental Conservation of the State of New York (hereinafter "DEC" or "Department") is responsible for the administration and enforcement of laws and regulations pertaining to the regulation and protection of air resources in the State of New York, including Articles 19 and 71 of the Environmental Conservation Law of the State of New York (hereinafter the "ECL") and Part 211 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (hereinafter "NYCRR"); and

2. ECL §19-0107 (2) and (5) define an "air contaminant" as dust, fume, gas, mist, odor, smoke, pollen , noise or any combination thereof, and, an "air contamination source" as any source at, from or by reason of which there is emitted into the atmosphere any air contaminant; and

3. The Department has documented that GREAT GARDENS, LLC ("Respondent Great Gardens") is a domestic limited liability company with offices located at 445 Horseblock Road in Yaphank, NY 11980; and

4. The Department has documented that LONG ISLAND COMPOST CORP. ("Respondent LICC") is an affiliated company of Respondent Great Gardens with offices at 100 Urban Avenue in Westbury, New York 11590; and

5. Respondents operate a transfer station for yard waste and other source separated organic waste at 445 Horseblock Road in Yaphank, NY ("Facility"), and operate such facility under DEC solid waste permit #1-4722-03647/00001 ("Permit"); and

6. Respondent Great Gardens is a "person" as defined in ECL §19-0107(1); and

7. Respondent LICC is a "person" as defined in ECL §19-0107(1); and

8. The Department has documented the following air resource violations during numerous facility inspections in January and February 2007:

First Alleged Violation

9. 6 NYCRR Part 211.2 states in relevant part that no person shall cause or allow emissions of air contaminants to the outdoor atmosphere of such quantity, characteristic or duration which are injurious to human, plant or animal life or to property, or which unreasonably interfere with the comfortable enjoyment of life or property; and

10. During an inspection on January 19, 2007, Department staff detected odors along Yaphank Avenue, and documented that the odors emanated from mulch materials stockpiled at the Facility, in violation 6 NYCRR Part 211.2; and

Second Alleged Violation

11. 6 NYCRR Part 211.2 states in relevant part that no person shall cause or allow emissions of air contaminants to the outdoor atmosphere of such quantity, characteristic or duration which are injurious to human, plant or animal life or to property, or which unreasonably interfere with the comfortable enjoyment of life or property; and

12. During an inspection on January 31, 2007, Department staff detected odors along Yaphank Avenue, and documented that the odors emanated from mulch materials stockpiled at the Facility, in violation 6 NYCRR Part 211.2; and

Third Alleged Violation

13. 6 NYCRR Part 211.2 states in relevant part that no person shall cause or allow emissions of air contaminants to the outdoor atmosphere of such quantity, characteristic or duration which are injurious to human, plant or animal life or to property, or which unreasonably interfere with the comfortable enjoyment of life or property; and

14. During an inspection on February 9, 2007, Department staff detected odors along Yaphank Avenue, and documented that the odors emanated from mulch materials stockpiled at the Facility, in violation 6 NYCRR Part 211.2; and

15. ECL § 71-2103 provides that any person who violates any provision of article nineteen or any code, rule or regulation promulgated pursuant thereto, shall be liable, in the case of a first violation, for a maximum penalty of fifteen thousand dollars; and

16. Respondents agree to take affirmative steps to prevent future violations of the ECL and associated rules and regulations; and

17. Respondents affirmatively waive any right to a hearing in this matter in the manner

provided by law and having consented to the issuing and entering of this Order pursuant to the provisions of the Environmental Conservation Law, agrees to be bound by the terms and conditions contained herein.

NOW, having considered this matter and being duly advised, **IT IS ORDERED THAT:**

I. Cease and Desist. Respondents shall cease and desist from violating any provision of the ECL and implementing regulations, more particularly ECL Art. 19 and Part 211 of 6 NYCRR, including, Schedule A attached hereto.

II. Compliance. Respondents shall immediately comply with all state and local air resource and protection laws, rules and regulations.

III. Civil Penalty. That with respect to the alleged violations, the Respondents concede to the imposition of a penalty in the sum of TWENTY-TWO THOUSAND FIVE HUNDRED ($22,500.00) DOLLARS, of which sum SEVEN THOUSAND FIVE HUNDRED ($7,500.00) DOLLARS shall be payable by **Certified Check or Money Order** upon execution of this Order, and the remaining FIFTEEN THOUSAND($15,000.00) DOLLARS to be suspended provided that Respondents adhere to the terms and conditions outlined in this Order, including, the Compliance Schedule attached hereto. The penalty shall be made payable to "N.Y. S. Department of Environmental Conservation." A check that is not bank certified or a money order will be returned to Respondents and this matter will be deemed unresolved.

IV. Submissions. All reports and submissions required in this Order and Schedule A attached hereto shall be made to Region One, New York State Department of Environmental Conservation, S.U.N.Y. Campus, 50 Circle Road, Stony Brook, N.Y. 11790-3409, Attention: to be directed to specific DEC programs in accord with instructions provided in paragraph III of the Schedule of Compliance annexed hereto. All communications will be considered submitted on the date of deposit with the U.S. Postal Service or delivery to a recognized carrier service.

V. Reservation of Rights. The Department hereby reserves all its legal, administrative and equitable rights arising at common law or as granted to it pursuant to statue or regulation, including, but not limited to, any summary abatement powers of the Commissioner.

VI. Modification. In those instances in which the Respondents desire that any of the provisions, terms or conditions of this Order be changed, it shall make written application, setting forth the grounds for the relief sought, to the Commissioner, c/o Regional Attorney, Building 40, SUNY, Campus, Stony Brook, NY 11790-2356. No change or modification to this Order shall become effective except as specifically set forth in writing and approved by the Commissioner or a duly authorized representative.

VII. Access. For the purpose of monitoring or determining compliance with this Order, employees and agents of the Department shall be provided access to Respondents' facility to inspect and/or perform such tests as the Department may deem appropriate, to copy such records, or to perform any other lawful duty or responsibilities, without prior notice of such inspection.

VIII. Indemnification. Respondents shall indemnify and hold the Department, the State of New York, their representatives, employees and agents, harmless for all claims, suits, actions, damages and costs of every name and description arising out of or resulting from the fulfillment or attempted fulfillment of the provisions presented hereof by the Respondent, their directors, officers, employees, servants, agents, successors or assigns.

IX. Future Compliance Respondents shall conduct all solid waste-related activities in strict conformance with Federal, New York State laws and regulations. For the purpose of insuring compliance with this Order, duly authorized representatives of this Department shall be permitted access to Respondents' place of business during reasonable hours, in order to inspect and/or require such tests as may be deemed necessary to determine the status of Respondents' compliance herewith.

X. Binding Effect. The provisions, terms, and conditions of this Order, including Appendix A, shall be deemed to bind Respondents and Respondents' officers, directors, agents, employees, successors and assigns and all persons, firms and corporations acting under or for them, including, but not limited to those who may carry on any or all of the operations now being conducted by Respondent, whether at the present location or at any other in this State.

XI. Collection Costs / Fees. Respondents' failure to pay any penalty amounts due under the terms of this Order may result in a 22% surcharge in recovery costs and a potential tax refund offset by the Department of Taxation and Finance.

XII. Effective Date. The effective date of this Order shall be the date upon which it is signed by the Commissioner or the Commissioner's Designee on behalf of the Department.

XIII. Unforeseen Events. Respondents shall not suffer any penalty under any of the provisions, terms and conditions hereof, or be subject to any proceedings or actions for any remedy or relief, if Respondents cannot comply with any requirements of the provisions hereof because of an Act of God, war, riot, or other catastrophe as to which negligence or willful misconduct on the part of Respondents was not foreseen or a proximate cause, provided, however, that the Respondents shall immediately notify the Department in writing, when it obtains knowledge of any such condition and shall request an appropriate extension or modification of the provisions hereof; Respondents will adopt all reasonable measures to prevent or minimize any delay.

XIV. Entire Agreement. This Order constitutes the entire agreement of the parties, and no provision of the agreement shall be deemed waived or otherwise modified without the written consent of the parties hereto or their lawfully designated successors.

Stony Brook, New York
Dated: July 27, 2007

ALEXANDER B. GRANNIS
Commissioner of Environmental Conservation
By: _____
PETER A. SCULLY
Regional Director

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

TO: Ernest T. Bartol, Esq.
Murphy, Bartol & O'Brien, LLP
22 Jericho Turnpike, Suite 103
Mineola, NY 11501-2976

Appendix 12

COUNTY OF SUFFOLK

STEVE LEVY
SUFFOLK COUNTY EXECUTIVE

DEPARTMENT OF HEALTH SERVICES

BRIAN L. HARPER, M.D., M.P.H.
Commissioner

March 20, 2006

Assemblyman Marc S. Alessi
6144 Route 25A
Bldg. A, Suite 5
Wading River, New York 11792

To Assemblyman Alessi,

Thank you for your letter dated February 10th in response to the County, State and Federal meeting held at the State DEC office regarding Mrs. Susan Sineo's concerns regarding the Manorville Composting site. Please note that in 1994 the New York State Department of Health did conduct a study of the health impact of composting in the town of Islip[1]. The study was unable to link the composting operation to allergy and asthma symptoms among residents living near the facility. Given that the Suffolk County Department of Health Services is not equipped to conduct this type of health outcomes research, at Dr. Dillon's request, the Suffolk County Department of Health and the New York State Department of Health petitioned the federal government Agency for Toxic Substance Disease Registry to consider an investigation into the Manorville composting area. This petition was declined.

The photocopies of the partial medical records you have included of the Sineo child have been reviewed. Although these documents appear to be incomplete, there is no documentation that the child has been evaluated for chronic respiratory or allergy symptoms. We would continue to encourage Mrs. Sineo to have her child evaluated by an allergist or pulmonologist and would welcome communication from the child's physician.

Sincerely,

Brian L. Harper, M.D., M.P.H.
Commissioner

cc: David Graham, M.D., M.P.H.
Patricia Dillon, M.D., M.P.H.

[1] A Prospective Study of Health Symptoms and Bioaerosol Levels Near a Yard Waste Composting Facility – Islip Composting Facility Town of Islip Suffolk County, New York State of New York Department of Health Center for Environmental Health 2 University Place Albany New York March 1994.

OFFICE OF THE COMMISSIONER
225 Rabro Drive East, Hauppauge, NY 11788 (631) 853-3000 Fax (631) 853-2927

Appendix 13

COUNTY OF SUFFOLK

STEVE LEVY
SUFFOLK COUNTY EXECUTIVE

DEPARTMENT OF HEALTH SERVICES

BRIAN L. HARPER, M.D., M.P.H.
Commissioner

June 19, 2006

RECEIVED
SUFFOLK COUNTY
2006 JUN 26 PM 2:51
HEALTH SERVICES
ENVIRONMENTAL QUALITY

Hon. Marc S. Alessi
Member of Assembly, 1st District
6144 Route 25A
Building A, Suite 5
Wading River, NY 11792

Dear Assemblyman Alessi:

I am in receipt of your letter dated May 12, 2006. It is apparent that further clarification of my position is needed. I concur that there is a need for more scientific evaluation to determine if there are health effects of composting. However, despite the fact that we are a large Department of Health Services, our responsibilities and mandates are also equally large. These include a skilled nursing facility, 11 community health centers, a medical examiner's office, and other major divisions, all of which rapidly consume the budget you described. It is not uncommon for statistically valid studies to require millions of dollars in research funding. Therefore, our resources to conduct environmental academic studies that would be of value are extremely limited. I do not recommend an academic study or health survey which is not epidemiologically sound, as the results are of no value. The term "Garbage in, garbage out" is a layman's expression which is descriptive of conducting a poorly designed study.

Any form of health study without the environmental component would not provide relevant associations between exposure (composting) and disease (respiratory symptoms or allergic symptoms). The difficulty lies in the fact that allergic and respiratory symptoms can emanate from a wide variety of sources. Without comparison levels of exposure from composting residues it is difficult to link increased symptoms to supposed exposure to residues.

The study both you and I have referenced in previous communications was conducted by the New York State Department of Health. A ***health survey*** was previously conducted as part of this study and found to be of limited value. The conclusion was "...the health survey itself is vulnerable to response bias and cannot be used on its own to draw conclusions about the health status of residents in the study neighborhood and any associations with operations at the Islip Composting Facility". This analysis included both a health survey and a health study with an environmental component and yet was

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225 Rabro Drive East, Hauppauge, NY 11788 (631) 853-3000 Fax (631) 853-2927

unable to correlate the incidence of allergy and asthma symptoms with *A. Fumigatus* spore levels. The authors did cite that such associations could not be dismissed [1] secondary to the limitations of their study and recommended additional environmental studies to assess bioaerosol exposures including better sampling techniques secondary to the highly variable nature of aerosol levels. This conclusion contributed to the joint request for further study from the Suffolk County Department of Health Services and the New York State Department of Health to the federal Agency for Toxic Substance Disease Registry (ATSDR). Our request to ATSDR was not in response to your call for a ***health survey***. Please also note that other studies have also included environmental specimens correlated to surveys [2,3].

In summary, there is a limited body of knowledge on this subject matter. I do agree that additional academic studies, preferably by multiple centers and lead by a national agency, to further evaluate the association between dusts, bacteria, fungi, and endotoxins from composting and allergic or respiratory illness are needed. However, after a review of the literature and information from consultants in the field of environmental epidemiology, it is clear that our county department of health does not have the resources to conduct a conclusive study.

I thank you for your concern regarding the health of our residents. We will be pleased to meet with you or your staff to discuss this matter further.

Sincerely,

Brian L. Harper MD, MPH
Commissioner

cc Hon. Steve Levy, Suffolk County Executive
Hon. Kate Browning, Suffolk County Legislator
Michael Deering, Department of Environmental and Energy
Peter Scully, New York State Department of Environmental Conservation
Greg Recer, New York State Department of Health
David G. Graham, MD, MPH, Suffolk County Department of Health Services
Patricia Dillon, MD, MPH, Suffolk County Department of Health Services
Vito Minei, PE, Suffolk County Department of Health Services

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[1] A Prospective Study of Health Symptoms and Bioaerosol Levels near A Yard Waste Composting Facility. NYSDOH. March 1994.
[2] Burkhart, Joseph. Health Hazard Evaluation Report 95-0203 Central Mau Composting Facility. NIOSH. June 1999.
[3] Herr, C.E. Effects of bioaerosol polluted outdoor air on airways of residents: a cross sectional study. Occupational Environmental Medicine. 2003: 60: 336-342.